

MINING engineering

JULY 1960



SME Membership Number

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COMING EVENTS

- Aug. 6-7, AIME Colorado Plateau Section, annual jeep trip.
- Aug. 15-25, International Geological Congress, Copenhagen, Denmark; for information, write Mineralogical-Geological Museum, University of Copenhagen, Øster Voldgade 7, Copenhagen K, Denmark.
- Aug. 20, AIME Adirondack Section, golf outing followed by panel discussion, program, Tupper Lake, N. Y.
- Aug. 22-26, Western Resources Conf. sponsored by University of Colorado, Colorado State University, and Colorado School of Mines on "Water Measuring and Meeting Future Requirements," Lindsay Memorial Courtroom, Fleming Law Building, University of Colorado, Colo.
- Sept. 8-9, SME Coal Div. and AIME St. Louis Section, joint meeting, Chase Park Plaza Hotel, St. Louis.
- Sept. 12-16, Pan American Congress on Engineering Education, Buenos Aires, Argentina.
- Sept. 12-18, International Mining Congress, sponsored by the Hungarian Mining & Metallurgical Soc., Budapest, Hungary.
- Sept. 13-16, 8th annual Engineering Management Conference, sponsored by AIME, AIEE, AIChE, American Inst. of Industrial Engineers, ASCE, ASME, IRE, Morrison Hotel, Chicago.
- Sept. 19-23, 7th Convention of Pan American Assn. of Engineering Socys., Buenos Aires, Argentina.
- Sept. 24, AIME Adirondack Section, mine or mill tour through industrial minerals plant of Gouverneur Talc Co., Gouverneur, N. Y. Dinner at Gouverneur Country Club.
- Sept. 27-Oct. 1, symposium on "Physics of Electrostatic Forces and Their Applications," Laboratoire d'Electrostatique et de Physique du Metal, Institut Fourier, Place du Doyen-Gosse, Grenoble, France.
- Oct. 4-5, SME Board Meeting, Brown Palace Hotel, Denver; AIME Board Meeting, Denver Hilton Hotel, coinciding with SPE Fall Meeting.
- Oct. 5, AIME Colorado Plateau Section meeting. Talk by AIME President Joseph L. Gilligan.
- Oct. 5-7, AIME Rocky Mountain Minerals Conference, Utah Section host, Newhouse Hotel, Salt Lake City.
- Oct. 6-8, 9th National Clay Conference, Purdue University, Lafayette, Ind.
- Oct. 7-8, Third Quinquennial Alumni Reunion of Minnesota School of Mines and Metallurgy. Open House and technical session, banquet-dance; Northwestern vs Minnesota football game, University of Minnesota, Minneapolis.
- Oct. 10-13, American Mining Congress, Mining Show (metal mining-industrial minerals convention, exposition), Convention Center, Las Vegas, Nev.
- Oct. 17-18, Symposium on Surface Mining Practices, College of Mines, University of Arizona, Tucson, Ariz.
- Oct. 17-19, Drilling and Blasting Symposium, sponsored by Colorado School of Mines, Pennsylvania State University, and University of Minnesota, Colorado School of Mines, Golden, Colo.
- Oct. 24-25, AIME-ASME Joint Solid Fuels Conference, Daniel Boone Hotel, Charleston, W. Va.
- Nov. 4, AIME Pittsburgh Section, Off-the-Record meeting, Penn-Sheraton Hotel, Pittsburgh.
- Nov. 7-10, Soc. of Exploration Geophysicists, annual international meeting, Galveston, Texas.
- Nov. 15-16, Anthracite Conference, technical and scientific aspects of anthracite utilization, The Pennsylvania State University, University Park, Pa.
- Nov. 18, American Mining Congress, coal division conference, Penn-Sheraton Hotel, Pittsburgh.
- Dec. 3, AIME Colorado Plateau Section, technical meeting, election of officers, WAAIME dinner-dance, Grand Junction, Colo.
- Dec. 5, AIME Arizona Section annual meeting, Pioneer Hotel, Tucson, Ariz.
- Feb. 22-25, 1961, International Symposium on Mining Research, sponsored by U. S. Bureau of Mines and Missouri School of Mines and Metallurgy, Rolla, Mo.
- Feb. 26-Mar. 2, AIME Annual Meeting, Chase Park Plaza Hotel, St. Louis.
- Apr. 12-14, International Symposium on Agglomeration, sponsored by SME, SPE, and TMS of AIME, Hotel Sheraton, Philadelphia.
- Sept. 17-20, Commemoration of the 50th Anniversary of Froth Flotation in the U.S.A., sponsored by AIME: Society of Mining Engineers' Mineral Beneficiation Division, Cosmopolitan Hotel, Denver.



MINING engineering

VOL. 12 NO. 7

JULY 1960

COVER The colorful miner on the cover is a reminder of the times 89 years ago when AIME was founded. The Directory in this issue is one measure of the growth of mining engineering since those days. Artist Herb McClure.

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SME DIRECTORY 680A



MINING ENGINEERING staff, Society of Mining Engineers, and AIME Officers are listed on the Drift page.

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PERSONNEL

THESE items are listings of the Engineering Societies Personnel Service Inc. This Service, which cooperates with the national societies of Chemical; Civil; Electrical; Mechanical; Mining, Metallurgical, Petroleum Engineers, is available to all engineers, members and non-members, and is operated on a nonprofit basis. If you are interested in any of these listings, and are not registered, you may apply by letter or resume and mail to the office nearest your place of residence, with the understanding that should you secure a position as a result of these listings, you will pay the regular employment fee of 60 pct of the first month's salary if a nonmember, or 50 pct if a member. Also, that you will agree to sign our placement fee agreement which will be mailed to you immediately, by our office, after receiving your application. In sending applications be sure to list the key and job number. When making application for a position, include \$6 in stamps for forwarding application to the employer and for returning when possible. A weekly bulletin of engineering positions open is available at a subscription rate of \$3.50 per quarter or \$12 per annum for members, \$4.50 per quarter or \$14 per annum for nonmembers, payable in advance. Local offices of the Personnel Service are at 8 W. 40 St., New York 18; 57 Post St., San Francisco; 29 E. Madison St., Chicago 1.

In addition to the listings below, ESPS maintains a more complete file of general engineering positions and men available. Contact nearest ESPS office, listed above. The New York office of ESPS will be open Thursdays until 7:00 P.M. for interviews.

MEN AVAILABLE

Mine Manager, B.Sc. in mining and metallurgical engineering. Twenty-five years mining all capacities. Location, immaterial. M-544.

Geologist, B.S. in geology 1954, age 32. Experienced preparation of maps and reports regarding occurrence, distribution, and geological conditions of underground water supply; underground sampling; logging drill cores. Location, domestic or foreign. M-545.

Research Minerals Engineer, M.S. in mining. Seven years ore dressing laboratory and chemical development, six years exploration, examination, and geophysics. Fluent French and some Portuguese. Desire laboratory or office work. Location, immaterial. M-546.

Mining Engineer, B.Sc. in mining, age 30, married, no children. Desire responsible position progressive company. Experienced underground and open pit mining engineering. Prefer Northwest and north central U.S. M-547.

Metallurgist, Australian graduate, age 32. Eleven years experience in Africa. Previous employment has covered development of processes for base metal ores, erection, and operation of concentrators. Married, no children. Will consider any location. Presently employed as mill superintendent. M-548.

Manager-Mining, Superintendent, B.S. M.S. in mining engineering. Broad background in open pit placer mining, cost, market, ore reserves studies. Experienced mine planning, budgets, company liaison mine plants, safety and personnel management. Production methods. Prefer U. S. M-550.

Maintenance Superintendent Mechanical Engineer, B.S. mechanical engineering, age 34. Twelve years experience in potash mining, milling, and processing as mechanical production, project, and plant engineer. Four years maintenance administration experience. Prefer warm climate; home New Mexico. M-1106-Chicago.

Mining Engineer or Supervisor, B.S. in mining and civil engineering. Twelve years experience including surveying, exploration operations, marketing, examinations, economics. Prefer U. S. M-551.

Assistant Mine Superintendent, age 54. Eleven years experience mine survey and development; seven years assistant mechanical superintendent petroleum works; 12 years chief mine engineer; seven years mine superintendent of small organization on lead, zinc, gold, and copper mines. Prefer South America, low elevation. M-552.

Manager, mining engineer (Canada), 44. Ten years experience mining, last six as manager of mining, rock excavation, and tunnelling. Three years manager of construction for rock drilling. \$10,800. Prefer Southwest, or any. Home: Mexico. Se-1487.

Superintendent, mining engineer, 39. Nine years experience, in charge of exploration, development, mining, underground, and surface production on mining and milling operations. \$9000. Prefer Western U. S. Home: California. Se-1453.

Mining Geologist or Sales, geologist, 30. Two years mining geology, examination and sampling, geology, topographic surveys for mining company. One year seismologist, computer, surveyor on exploration. \$5200. Any location. Home: New York. Se-1381.

General Manager, Superintendent, 46. Broad experience in exploration, development, construction, and operation of metal mines. Last seven years in uranium. Hard worker, adaptable, gets results. Excellent record as general manager and superintendent of successful, low-cost, high-production, underground operations. Experienced with modern, trackless, underground mining equipment. Presently employed as manager. Prefer U. S. or Canada. Salary open. Home: Colorado. Se-1262.

Superintendent, Manager, mining engineer, 39. Experienced in management, 15 years experience underground, some open pit. Experienced underground diesel equipment mining and open and shrink stowing. Solid background as chief engineer, mine and general superintendent, general manager. Salary open. Prefer Midwest U. S. Home: Southwest. Se-1099.

Mining Geologist, mining engineer, 23. Ten months as highway engineer for Forest Service. Five months student assistant for university, compiling data for research on ammonium nitrate. Three months as engineer trainee for copper mining. \$6000. Prefer foreign, western U. S.

Superintendent or Chief Engineer, geological engineer, 32. Professional engineer in Canada. Two years experience exploration and open pit engineering. Four years experience construction supervision and management; seeking position with mining organization, nonmetallic minerals, open pit coal or iron ore preferred. Salary open. Any location. Home: Canada. Se-1224.

Mining engineer, graduate mining engineer, 26. Two years with leading mining and construction equipment manufacturer working with compressors and all types of rock drilling equipment, open pit and claim, road, highway, and underground survey. Operate many types of heavy equipment. \$6500. Prefer central California. Home: California. Se-1165.

Mine Engineer, mining engineering, 32. Young, ambitious, experienced all phases open pit and underground; exploration, development, and production. Want production or engineering assignment with challenge and opportunity. \$7500. Prefer South. Home: Arizona. Se-878.

Geologist, Mine Engineer, geologist, 37. Five months consultant, examination, exploration, development of mineral deposits. Nine years experience planning, layout, mine production, quality control, exploration and development, construction, maintenance of engineering records and reports, supervise drilling, mine sampling for underground and open pit operations; mining and smelting facilities. \$7200. Prefer Southwest, West, foreign. Home: Arizona. Se-781.

Manager, Superintendent, mining engineer, 45. Fourteen years experience in design and construction of mine plants, set up production, schedule, plan mining operations, supervise operation for mine, mill, and smelters. \$12,000. Prefer West, South, East. Home: Wyoming. Se-520.

Mine Superintendent, mining engineer, 36. Five years supervisory experience in underground mines. Seven years experience as sales and technical representative for major explosives manufacturer. \$8,400 to \$10,800. Prefer South, Southwest. Home: Northwest. Se-1330.

Mining Geologist, geologist, 33. Four years experience (quicksilver and tungsten) geologic mapping, mine engineering, exploration and development, planning on underground mines. Mine and prospect examination, drafting, report writing. Have operated own retail business. \$6600. Prefer western U. S., foreign. Home: California. Se-1008.

Geologist, geological engineering, 30. Two summers as field geologist in iron industry. Five months experience as quarry engineer in nonmetallic industry as part of management training program. One year experience supervisory with 15 to 24 man crews. \$7200. Prefer West, Alaska, north Midwest. Home: Nevada. Se-902.

(Continued on page 632)

FOR SALE

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FOREIGN EMPLOYMENT

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PERSONNEL

(Continued from
page 630)

Mining Engineer, Foreman, mining engineer, 28. Two years exploration development work, diamond drilling, drifting, mapping, cost estimates, design, equipment procurement, surveyor, contract measurement. Four years part-time miner. \$6500. Prefer U. S., foreign. Home: California. Se-741.

POSITIONS OPEN

Supervisor, Production, graduate mining engineer, with minimum of ten years supervisory experience in open pit mine handling 30,000 to 50,000 tpd; must have complete command of working Spanish language. Will be responsible for mine production of a specific zone in large open pit mining operation. Responsible for controlling shovel movements and output, direction of truck haulage, and coordination with railroad operations. Salary, \$10,200 year to start. Location, South America. F9085.

Vice President-General Manager to head up team to organize the management and administration of a government-owned mining operation. Mining experience not required but must have experience in investment and corporation management. Salary, \$25,000 year plus or minus. Location, Mediterranean area. F9083.

Technical Consultant, graduate mining or metallurgical engineer, experienced in the design of beneficiation or washing plants for iron ore mining. Plant in Liberia being designed by U. S. manufacturer. Will coordinate and act as liaison between mines and service organ in New York. Salary, \$12,000 to \$15,000 year. W9076.

Assayer to take charge of fire assaying for gold and silver in quartz ore; also must have experience in wet assaying for base metals. Salary, \$4200 to \$8000 year and up depending on experience, plus two and a half months salary as required by local law. Location, South America. F9072.

Process Engineer with field experience in open quarry operations; should also be qualified to perform the detail engineering jobs of process study, equipment investigation, layout design, etc. and supervise erection and initial operations of stone crushing and screening plants. Knowledge of crushers, conveyors, screens, stone washing plants, and preferably some experience with lime desired. Location, South. W9029.

Mining Engineer, experienced working a limestone quarry. Headquarters, Pennsylvania.

Development Engineer, graduate, some experience desirable. For development work in area of explosives and propellants. Salary open. Southwest. For a chemical company. SJ-5289.

Mining, Civil or Mechanical Engineer, minimum three years experience, preferably more, in design, computation and layouts on structural steel and heavy equipment used in open pit and underground mining and milling plants. Must be familiar with typical mine and mill plant engineering-type operation and able to furnish sound advice and recommendations on structural elements for installing new equipment and revamping existing plant. \$7200 to \$7800. Idaho. SJ-5283-R.

Mine and Mill Superintendent, mining engineer, 55 to 60. Field man in charge of mine and mill experience in underground gold mining. Must speak Spanish and be able to take charge of maintenance, repair of diesel engine equipment, mining, milling operations as work superintendent or field manager for 30-tpd underground gold mine. In very remote area, will have to go single status first; then bring family. \$9000 plus room and board. At least one year's work, may be permanent. Mexico (5000 ft elevation). SJ-5243.

Mine Engineers, graduates and some experience either in underground nonmetalliferous or deep coal mining. For production planning, cost forecasting, layout of mining systems, design of installations such as conveyors, shafts, raises, etc., and also routine mining operating problems. For mine engineering staff of eleven. 14,000 tpd. Salary open. Southwest. SJ-5260.

Junior Mining Engineer, recent graduate from schools on West Coast, Minnesota, Michigan or eastern states, military service completed. Will receive training in underground and open pit mining and principal duties will be investigation and design for advanced open pit mining method. Salary open southern California. SJ-5232.

Mining Geologist, graduate, 28 to 35, about five years experience. For general geological duties applicable to operating mine, involving underground geological mapping, surveying, stope mapping, and assisting engineering department. Salary open. Colorado. SJ-5249.

Mining Superintendent, 45 to 55, at least 20 years experience with underground mining (preferably room and pillar), but ability to supervise mine and come and handle men). Knowledge of earth-moving, diesel equipment, mining equipment, working knowledge of surveying, ventilation and electrical installations. Supervise all mining operations as well as mining camp. Car furnished. Salary open. Living quarters, but no school facilities for children. (50 miles from nearest town.) Desert area of eastern California. SJ-5248.

Mining Geologist, geologist or mining engineer, young. Two years or more working experience in mining engineering and surveying, including sampling, assaying, chemistry for lab work and geological investigations. Work in small mine and a knowledge of mercury would be helpful. For mercury mining company. \$6000 to \$7200. California. SJ-5243.

Soils Engineer, young, duties would primarily be in the field logging and sampling of undisturbed soils for foundations investigations. Some laboratory and office work would also be required from time to time. \$6200 to \$7200. Southern California. SJ-5231.

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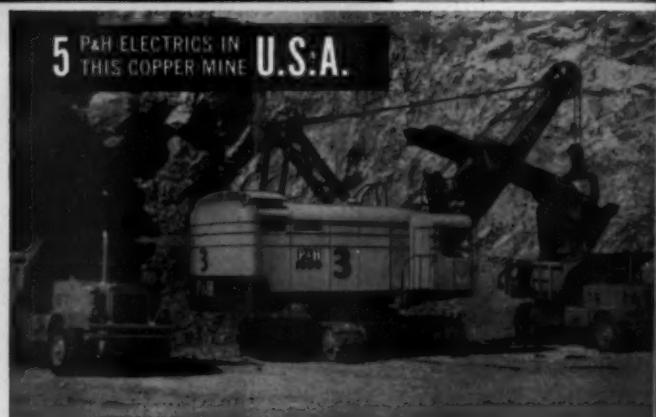
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Mineral Information

An International Directory of Engineering Source Material

BOOKS

Order directly from the publisher all books listed below except those marked • • • The books so marked (• • •) can be purchased through AIME, usually at a discount. Address Irene K. Sharp, AIME Book Dept., 29 W. 39 St., New York 18, N.Y.

Correction

On page 304 of the April issue we listed the British publisher and price for **Gold** by C. H. V. Sutherland. Since then we have received notice that the book has been published here by McGraw-Hill Book Co. Inc. at \$7.95 and orders for the British edition cannot be filled.

Metal Statistics 1960, American Metal Market, 18 Cliff St., New York 38, N.Y., 830 pp., \$3.50, 1960.—The 53rd edition of the Little Red Book has supplemented its present statistical information on ferrous and nonferrous metals with new tables on wage history in the steel industry, primary pig aluminum prices in U.S., world tin plate production, spiegeleisen production and consumption, iron and copper powder shipments in US, and uranium ores and concentrates in US.

Asbestos by W. E. Sinclair, second edition, Mining Publications Ltd., 482 Salisbury House, London Wall, London E.C. 2 England, 536 pp., \$10.50, 1959.—This new edition contains several new chapters dealing with primary production and the manufacture of asbestos products in North America, a field recently visited by the author. These chapters include a geological appraisal of the future potential in the area, details of actual mining and milling at the various producing centers, and descriptions of the latest fabrication techniques. This aspect has been brought up to date in respect of all the main world producing and manufacturing fields. Relevant sta-

tistics covering production, distribution, marketing, and prices are included. The basic chapters dealing with the origin of the asbestos minerals and the record of recovery, from source to final uses, have been revised, with the description of new discoveries and particulars of recent developments in various branches of the industry.
• • •

Canadian Mines Register of Dormant and Defunct Companies, Northern Miner Press Ltd., 116 Richmond St., Toronto 1, Canada, 420 pp., \$15, 1959.—A valuable reference work listing more than 13,000 companies no longer in business; some recently defunct, others out of existence for close to a century. Gives information on successor companies, values of shares, and exact status at present. • • •

Minerals of New Mexico by Stuart A. Northrop, revised edition, University of New Mexico, Albuquerque, N.M., 681 pp., \$10, 1960.—This volume includes descriptions and records of the place of occurrence of every mineral found in New Mexico arranged alphabetically and cross referenced. In addition it contains a history of mineralogy and mining in the state and the economic aspects of New Mexico's mineral industry.
• • •

Future of Non-Ferrous Mining In Gt. Britain and Ireland, The Inst. of Mining and Metallurgy, 44 Portland Pl., London W. 1, England, 614 pp., \$8.40 (60s), 1959.—This volume contains the proceedings of a Symposium arranged by the Institute and the United Kingdom Metal Mining Assn. held in September 1958. The purpose of the Symposium was to review the mineralized areas of Great Britain and Ireland and discuss technical and economic problems affecting their exploration and development; to make an appraisal of the potentialities of the industry and to point the way to its revival. Twenty-four papers were presented. These plus discussions of the papers make up the volume. • • •

Copper Costs and Prices: 1870-1957 by Orris C. Herfindahl, The Johns Hopkins Press, Baltimore 18, Md., 272 pp., \$6, 1959.—This study sponsored by Resources for the Future

Inc. attempts to develop some relevant evidence on cost for one important natural resource commodity and, in the process, to throw some light on the general problem of long-run cost increase that will be of use in the study of other commodities. It is divided into three parts with chapter 1 serving as an introduction. Part 1 covers market

(Continued on page 638)

The forthcoming **Annual Edition of The Engineering Index-1959** will be ready for distribution in June 1960. Advance orders are now being accepted because there is a limited edition of this important annual volume which has served the engineering profession for over 75 years. The annotated reference items published provide a comprehensive digest of the important information on technical, scientific, and economic problems as recorded last year in engineering magazines, special bulletins, and government reports gathered from all over the world. The forthcoming volume will contain annotations on over 30,000 articles in 249 fields of engineering interest. It will devote over 100 pp. to the list of authors covered in more than 1500 technical periodicals. It includes a list of these publications of engineering, scientific, and technical societies, engineering and industrial periodicals, and publications of government bureaus, engineering experiment stations, universities, and other research organizations. Not all articles in these publications are indexed, selection is made on the basis of articles dealing with the art and science of engineering.

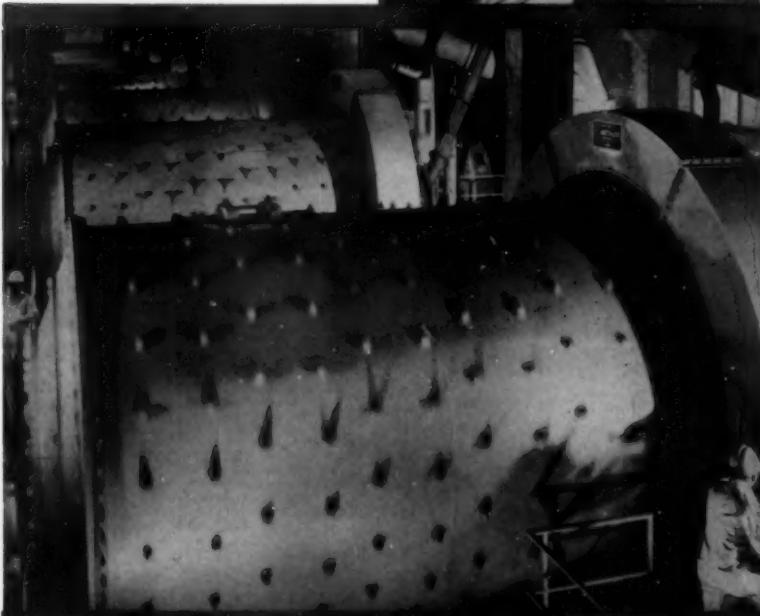
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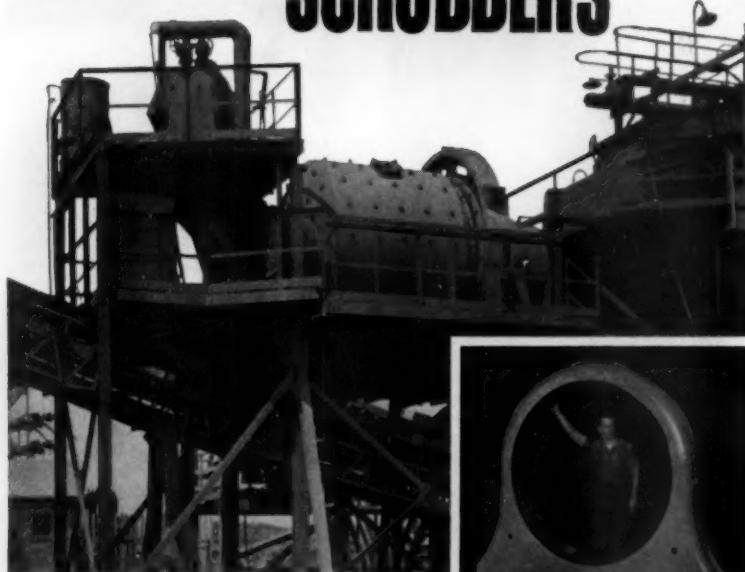
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BOOKS

Continued from
page 636

prices and long-run costs; part 2 periods of unusual price behavior; and part 3 conclusions and summary. • • •

Physics and Geology by J. A. Jacobs, R. D. Russell, and J. Tuzo Wilson, McGraw-Hill Book Co., Inc., 436 pp., \$9.75, 1959.—This book describes the nature, composition, and behavior of the earth by integrating information from geophysics, geology, and geochemistry. The subject matter is broad in scope. Subjects from pure geology and from geophysics are overlapped in an effort to unite these two disciplines. Special emphasis is given to the solid earth, although certain aspects of the physics of the upper atmosphere are included. • • •

Silhouettes of Charles S. Thomas by Sewell Thomas, The Caxton Printers Ltd., Caldwell, Idaho, 276 pp., \$7.50, 1959.—In the course of this biography, there is much new historical material about the boom mining towns of the West and the early-day labor difficulties in the mines. • • •

Engineering College Research Review 1959, The American Soc. for Engineering Education, Urbana, Ill., 470 pp., \$2, 1959.—This biennial report lists active research projects, as well as giving information about the research policies, personnel, administration officers, and magnitude of the research program for each of the member colleges and universities. • • •

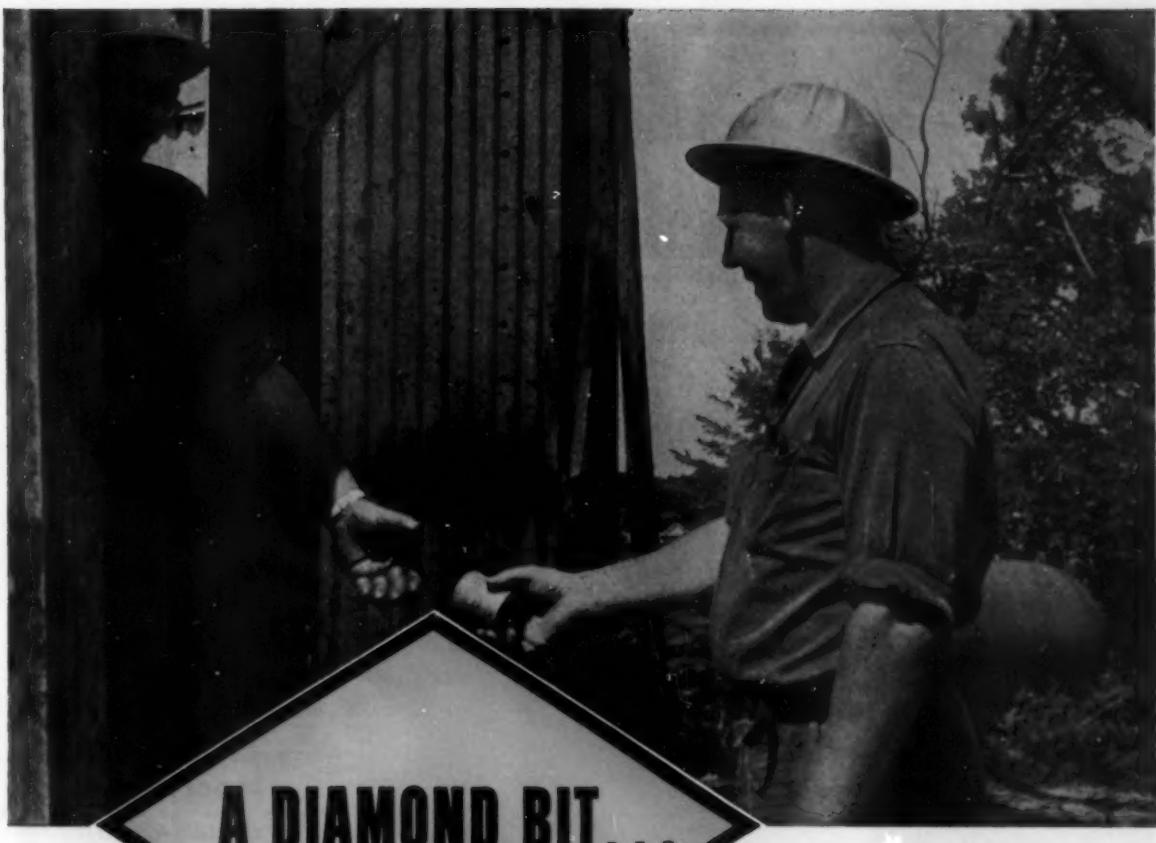
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(Continued on page 641)



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Continued from
page 638

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FOREIGN PUBLICATIONS**Malaya**

Geological Survey
Federation of Malaya
Scrivener Road
P. O. Box 1015, Ipoh

- Airborne Magnetometer and Scintillation Counter Survey, Trengganu & Pahang, Area 2, Economic Bulletin C-1.2, \$5 (Malayan currency) 1959.
 Airborne Magnetometer and Scintillation Counter Survey, Kedah & Perlis, Area 6, Economic Bulletin C-1.6, \$5 (Malayan currency), 1958.
 Airborne Magnetometer and Scintillation Counter Survey over parts of Johore & Malacca, Area 5, Economic Bulletin C 1.5, \$5 (Malayan currency).

The Netherlands

Geological Nomenclature, \$12, 1959; order from Martinus Nijhoff, Lange Voorhout 9, P.O. Box 269 Den Haag, Holland.

New Zealand

Government Printing & Stationery Dept., Wellington, New Zealand

- Geology of Kaitangata Coalfield, Bulletin No. 59, paper bound 60s (approx. \$8.35) or 70s cloth bound (approx. \$9.85).
 Geology and Hydrology of Nine Island, South Pacific, Bulletin No. 62, 6s (approx. 85¢).
 New Zealand Geological Map of Wangani, Sheet 10, 5s (approx. 70¢).
 Coal Mines Statutes, 1ls. (approx. \$1.53).
 The Geology of Motueka Subdivision, Bulletin 35, 30s. (approx. \$4.17).

Puerto Rico

Program and Abstracts of Second Caribbean Geological Conference, gratis; Road Log and Guide, reprinted, \$1; order from College of Agriculture and Mechanical Arts, University of Puerto Rico, Mayaguez, Puerto Rico.

Swaziland

Annual Report of the Geological Survey and Mines Department, 1958, approx. 42¢, (3 v.), order from P.O. Box 9, Mbabane, Swaziland, Southern Africa.

ABSTRACTS

**The Company
that cares enough
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Laboratory Equipment

**4" x 6" Massco
Laboratory Jaw
Crusher**

Welded steel frame; manganese steel jaw and cheek plates; bronze bushed bearings; smooth jaws give better product and easier cleaning. Adjust for plate wear and product size by convenient hand wheel adjustment.



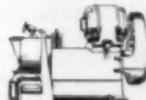
**6" and 10" Massco
Gy-Roll Reduction
Crusher**

Reduces $\frac{1}{2}$ " feed to as fine as 10 mesh in single pass. High capacity, low power consumption.



**Laboratory
Crushing Rolls**

Sizes (Diameter x width): 8" x 4", 10" x 6", 10" x 8", 12" x 10" and 12" x 12". Adjustable roll space setting up to $\frac{3}{4}$ ". Double V-belt drive. Heavy, cast Meehanite frame absorbs vibration, results in long life.



**Massco-McCool
Pulverizers**

Disc type grinder with a planetary movement. No gears. Will grind $\frac{1}{4}$ " to 150 mesh in one pass.



**Marcy Pulp
Density Scale**

Gives direct reading of weight; specific gravity of liquids, pulps, and dry solids; percent solids in pulp. Very accurate. Easy to clean.

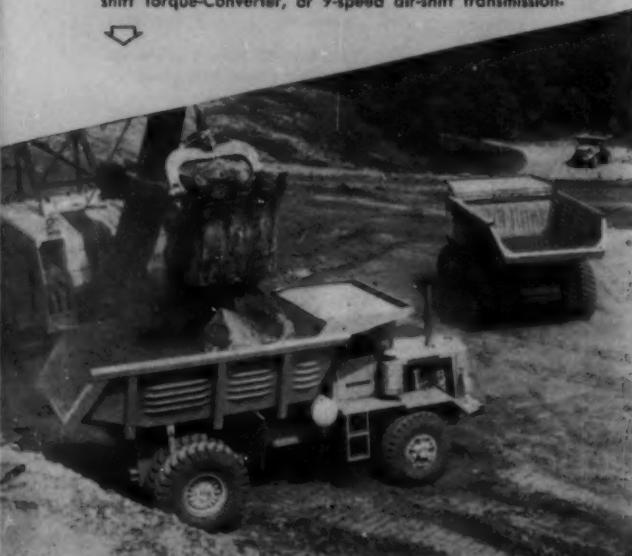
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Now "trade" dead weight for payload..and haul 40% faster!

Heap-load the big-target Payhauler body in minimum time. Strong rock-ribbed corrugations absorb shock—resist wear and distortion. Choose the "95" with power-shift Torque-Converter, or 9-speed air-shift transmission.



New strength-multiplying corrugated body design results in payload-gaining weight reduction of both International Payhauler models. New "95" capacity is increased to 27 tons—and the new "65" becomes the only 19-tonner on the market!

Look at those exclusive, rock-ribbed body corrugations! International applies this strength-multiplying principle to reduce Payhauler® body weight by an amazing 30%! You "trade" 2½ tons of power-wasting dead weight for 3 bonus tons of payload capacity in the new 95 Payhauler!

New high-torque, high-output diesel power highballs 27-ton payloads up to 40% faster than the former "95" could haul only 24 tons! The new 375 hp DT-817 International diesel engine gives the new 95 Payhauler the wallop of 40 extra turbocharged "horses."

Prove to yourself that top load-carrying capacity plus top power-to-weight ratio give 95 Payhaulers tremendous profit-earning advantages. Add up other big Payhauler exclusives: fast reverse, up to 7.1 mph. for spotting speed; big-target bodies for loading zip; 11-second inverted-hoist dumping; load speeding safety of torqmatic braking and positive power-steering! Let your International Construction Equipment Distributor demonstrate!



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A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors... Self-Propelled Scrapers and Bottom-Dump Wagons... Crawler and Rubber-Tired Loaders... Off-Highway Haulers... Diesel and Carbureted Engines... Motor Trucks... Farm Tractors and Equipment.

MANUFACTURERS NEWS

NEWS / EQUIPMENT / CATALOGS

Mine Truck

Model KD-5A ore carrier from *German Bros.* features automatic transmission with three speeds in both forward and reverse, air brakes, heavy-duty mine cushion tires, plus hydraulic power steering and hy-



ddraulic controlled dump body. Having a carrying capacity of 12 to 15 tons and a 115-hp engine, the truck is equipped with exhaust gas filtering and diffusion system for underground mining. **Circle No. 1.**

Explosive Tester

Explosive igniters, detonators, primers, or squibs may be checked quickly and safely by a pocket-sized tester developed by *Kinetics Corp.* Weighing less than 1 lb, the battery-operated unit will indicate whether an explosive device will operate properly or misfire. Maximum test current is limited to 10 ma, thus prohibiting any danger of accidental explosion during the test. The tester is a rugged, sealed unit which is reported to withstand rough treatment in the field. **Circle No. 2.**

Front End Loader

Caterpillar Tractor Co. has announced the availability of the Caterpillar 966 Traxcavator, a 140-hp unit with a standard 2½-cu yd bucket. Featuring an open cockpit for easy accessibility, the unit has a maximum lift height of 154 in. with



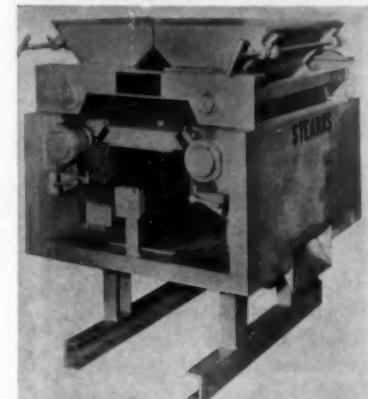
a reach of 35% in. at that height, a 24,000-lb breakout force, and four operating speeds. In addition, the machine has a 205-hp turbocharged diesel engine and three separate sets of brakes. **Circle No. 3.**

A-N Blasting Primer-Initiator

A primer has been introduced by *Chromalloy Corp.*, to replace dynamite as initiating force of A-N blasting. Model 151 Saf-T-Boost Initiator, weighing 13 oz and contained in a 3-in. diam cardboard box, requires no tying, splicing, or taping and is suitable for decking, stemming, or any other blasting technique. It is reported to withstand the roughest treatment without detonating, yet when fired, it can generate a detonation velocity exceeding 20,000 fps. In addition to being cheaper and safer than other primers, it is not troubled by hypersensitivity at freezing temperatures. **Circle No. 4.**

Magnetic Separator

Type KT single-roll induced magnetic separators are being produced by *Stearns Magnetic Products*. Each unit features a high-field intensity for low-cost cleaning and/or separating of fine-particle material. For



many applications, single-roll separators are reported to be equal in performance to conventional multiple-roll models but less expensive to purchase and operate. The units are recommended for particle sizes of 10 to 200 mesh and are available in roll widths of 10 in., 20 in., and 30 in. in either single or twin (common-coil) styles. **Circle No. 5.**

Pocket Radio

General Electric Co. is now marketing an all-transistorized pocket-size personal radio communications receiver. Termed the "Voice Director," the 12-oz unit is designed for indoor and outdoor use. It permits key personnel to be contacted instantly by a base station transmitter, a two-way car radio, or by a portable unit operating on the same frequency. **Circle No. 6.**

Bench Drill

Atlas Copco has designed the BMP-31 "bencher," a self-standing, air-operated unit for small-scale projects or hard-to-reach work areas. Also usable for shaft-sinking, it is



reported to drill faster and at lower cost than hand-held machines. Designed for 5-ft steel changes, the units mount heavy-duty, high-capacity rock drills. Two units can be operated simultaneously by one man. **Circle No. 7.**

Disposable Drill Bits

For dustless vacuum-type drills, *Western Rock Bit Mfg. Co.* has developed two types of "one use" bits. Type TCVA or TCVB, a shallow tungsten-carbide insert bit for low-cost footage, fits either class A or class B taper connections and needs no resharpening. Type SLVA or SLVB bit is an inexpensive steel bit which is used until worn out. It features a wing design and a pilot construction which chips the rock ahead of the cross wings and eliminates the pulverizing action common to conventional cross bits. Both types are of 5-hole design and are interchangeable. **Circle No. 8.**

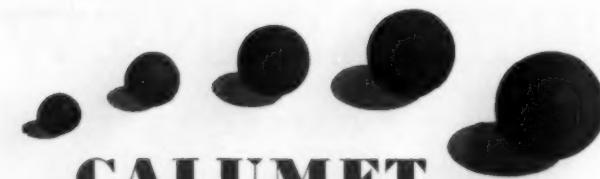
Vibratory Feeder

For handling materials in a wide range of particle sizes, *Eriez Mfg. Co.* has developed a heavy-duty vibra-



tory feeder, designated Model 75A. Having a rated output of 75 tph at normal operating level, the unit is powered by an electropermanent

(Continued on page 644)



CALUMET NI-HARD* GRINDING BALLS



... Stand the Day-After-Day Grind



In wet or dry grinding, Calumet Ni-Hard grinding balls offer maximum wear resistance. For instance, in exhaustive tests made in wet grinding of copper ore, they offered 75% greater wear-resistance than any other type of

ball. For dry grinding, the wear life proved to be 4 to 1 better than that of forged steel balls.

Calumet Ni-Hard grinding balls have been thoroughly job-tested not only in Calumet and Hecla operations but in the mills of a number of other leading concerns throughout the country. The results invariably have been shown in greater efficiency and lower costs—benefits that can also be yours once you have used Calumet Ni-Hard grinding balls in your own mills.

A complete range of sizes is available to you: $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", 1", $1\frac{1}{4}$ ", $1\frac{1}{2}$ " and 2". Let us send you complete information. Write TODAY.

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Manufacturers News

(Continued from page 643)

magnetic a-c drive system. Five standard size trays of flat and tubular designs are available in mild or stainless steel. Special sizes can also be furnished upon request. Circle No. 9.

Chain Flight Conveyors

Columbus McKinnon Chain Corp. has introduced two chain flight conveyors operable in seams down to 30-in. thickness. Called "Ratio-Feeders," the machines load belt conveyors at a controlled rate while speeding up shuttle car operation



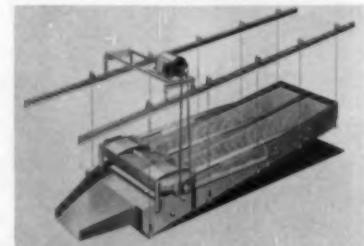
and preventing belt overloading, spillage, and damage. Designated the RF-40 series, the units are of 24-in. and 30-in. height with $2\frac{1}{4}$ to $3\frac{1}{2}$ -ton capacities. Featuring more accessible controls and refined output adjustment, the machines are available as permissible equipment with either a-c or d-c components. Circle No. 10.

Quarry Chain

Reported to possess superior abrasion resistance and greater strength than regular alloy quarry chains, the improved high-strength Accoloy quarry chain from American Chain & Cable Co. has been designed to meet the greater demands of quarries and mines which use $\frac{3}{4}$ to $1\frac{1}{4}$ -in. chains for digging and hauling of rock. By placing the weld at the end of the link, side bend properties have been increased to allow for sharp bends over stone edges. Circle No. 11.

Shaker Screen

Fairmont Machinery Co. has designed a screen featuring a more compact design plus increased operational capacity. Suspended from wire ropes to prevent reciprocating forces from being transferred to the



structure, the unit is furnished with adjustable stoke and speed ranging from $\frac{1}{2}$ in. at 1000 rpm to 5 in. at 165 rpm. Power is supplied to the unit by a 3-phase induction motor. Circle No. 12.

(21) DRY PROCESSING CATALOG: Sturtevant Mill Co. has issued an 8-page catalog describing its full line of dry processing equipment which includes separators, blenders, mixers, grinders, and other crushing and milling machines.

(22) CRUSHER: The Pennsylvania Crusher Div. of Bath Iron Works Corp., has issued bulletin 2020 describing the Hercules Single Roll Crusher. The Hercules is designed for heavy duty primary or secondary crushing of such materials as cement rock, gypsum, mine refuse, muddy materials, limestone, ores, shale, slag, etc. The bulletin uses photographs and engineering drawings in describing the features, operation, application, and capacities of the crusher.

(23) DRILL STEELS: Thor Power Tool Co. has published an 8-page illustrated brochure entitled "Drilling Rock With Coupled Steels". The brochure details proper operational and maintenance procedures and discusses correct rotation, drill, and feed control operations. Information pertaining to starting a hole, the proper feed, drilling and lubrication practices, adding and removing steels, bit maintenance, and dust control is also included.

(24) BIT GRINDERS: Three types of bit grinders that perform custom grinding at the job site are now available from Gardner-Denver Co. Described in bulletin 6-6ii, the portable, bench, or pedestal-type grinders will sharpen any detachable bit up to 12 in. diam. Fourteen design features are listed as well as grinder size specifications.

(25) EQUIPMENT CATALOG: Catalog 605, a 68-page condensed booklet from Syntron Co. presents descriptions, data, and specifications, on all Syntron products including vibrators, car shakers, car rappers, hopper level switches, conveyors, spiral elevators, and vibrating screens.

**FREE
LITERATURE**

(26) VALVES: The Galigher Co. details its "Delta" valve in bulletin DV-059. Designed especially for handling abrasives in suspension as well as acids and other corrosive materials, the valves are actuated by either compressed air or liquid. The brochure includes engineering specifications, cut-away diagrams, and drawings of typical actuating methods.

(27) MOLYBDENITE FLOWSHEET: Bulletin M7-F68 issued by Denver Equipment Co. is a flowsheet study of the flotation of molybdenite from copper. The bulletin illustrates the molybdenite section of a copper mill starting with the copper rougher flotation concentrate, through the conditioning and flotation sections, to the multiple cleaning stage which produces a 90 pct MoS₃ concentrate.

(28) VIBRATING CONVEYORS: Jeffrey Mfg. Co. has issued an interesting, well-illustrated catalog (No. 954) of mechanical vibrating conveyors. Complete with photos, charts, and engineering drawings, the 68-page manual details the features and construction of all conveyors of this type which are presently available from the company.

(29) QUARRY DRILL: Gardner-Denver Co. has published bulletin 6-6gg describing its Mole-Drill model AM5A. This down-the-hole drill has a rugged 5-in. diam. and is 41 in. long with bit attached. It is designed for heavy-duty use in quarry operations as well as in construction projects. Positive hole cleaning is assured by air passing through the air tube to the bit and by additional exhaust vents in the drill.

(30) MAGNETIC PULLEYS: Eriez Mfg. Co. has issued a 6-page leaflet describing its complete line of Eriem-powered permanent magnetic pulleys. Photographs and tables are provided as guides to selection, capacities, and dimensions. The pulleys are available in two designs, four magnetic strengths, eight diameters, and 14 standard belt widths.

(31) GRINDING MILL GEAR DRIVE: A compact space-saving drive arrangement for grinding mills has been devised by Allis-Chalmers. Termed "Twinducer" and described in leaflet No. 07B9607, the drive unit occupies 50 pct less space than conventional gear box drives. The Twinducer harnesses the power of two synchronous motors located on the mill side of the drive. Once the electrical load is distributed and balanced, no further adjustment is needed nor are floating gear or pinions required.

(32) EARTH MOVERS FOR MINING: "Successful Mining", an 8-page two-color booklet from Caterpillar Tractor Co. discusses a variety of profitable mine techniques and operations employing scrapers, rippers, front-end loaders, and bulldozers. Examples are given of such practices from mine sites in the U. S., Canada, and Southern Rhodesia.

(33) MAGNETIC SEPARATOR: A low intensity magnetic separator or scalper, based on the rotating field principle and designed for laboratory use, is fully described in bulletin RFB-102 from Carpcor Mfg. Corp. Design features, applications, and principle of operation are supplied. The unit has a head feed capacity up to 600 lbs per hour and an unusual system of curtain feeding and flux adjustment to give differential low intensity separations. The separator is also adaptable for production control and flow sheet development.

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61	62	63	64						

Students should write direct to manufacturer.

(34) SCREW CONVEYOR DRIVE: Bulletin 7106 from *The Falk Corp.* describes their new line of screw conveyor drives. The 20-page booklet discusses such subjects as design features, accessories, and technical data including selection and dimension information, NEMA motor dimensions, and nominal sheave ratios for typical unit ratios and speeds.

(35) EQUIPMENT STEAM CLEANERS: If cleaning heavy equipment at the mine or mill site is a problem, request a 12-page catalog recently issued by *Malsbury Mfg. Co.* The booklet pictures and describes three types of steam cleaning machines: fireless steam cleaners, self-contained steam cleaners, and hydraulic pressure combination cleaning systems. Specifications are provided for each model. Tricycle, trailer, and stationary mountings which are available for most models of steam cleaners are also shown.

(36) AIR FILTER: *Union Carbide Corp.* offers a 4-page illustrated bulletin on its new ULOK Cube Type Replacement Air Filter. ULOK Filter Bulletin B tells how cube filters can reduce filter bank face area by more than 50 pct. The physical process of reverse loading, primarily responsible for the high efficiency and long life of the ULOK filter unit, is described in detail.

(37) TRACTOR BLADES: "Best by Job Test", a 12-page illustrated booklet from *Caterpillar Tractor Co.*, reports how cutting edge costs of tractor blades can be reduced. The brochure features reports on the use of various types of cutting edges in material ranging from rock and gravel to highly abrasive sand. The benefits of well-designed induction-hardened edges are demonstrated in terms of less down time and longer life. Features and benefits of multi-section dozer and scraper edges are also cited.

(38) DUST SEPARATORS: Bulletin D-20 released by *The Day Co.* gives details of its Dual-Clone dust separators. The 8-page brochure includes performance data, installation photos, selection and dimension charts for Dual-Clones and Dual-Clones Supports. Dual-Clones utilize the basic principles of dust separation by cyclonic action plus internal skimmers to produce a two-stage separation within the dust collector.

(39) VARIABLE SPEED DRIVES: "Type RS P.L.V. Variable Speed Drives", 6-page folder No. 2874, describes *Link-Belt Co.'s* new constant horsepower variable speed drives designed to meet capacity demands up to 50 hp and ratios up to 5½:1. A twin-strand single roll chain that operates between a pair of smooth facing wheels changes the ratio and output shaft speed to permit stepless speed adjustments between maximum and minimum settings. Applications for the new drives include smooth, precise speed control for timing processes required in drying and heat treatments, for mixing, for synchronizing, and for conveying and handling systems.

(40) CARRIAGE BITS: *Gardner-Denver Co.* is offering bulletin 6-6HH which describes its tungsten carbide insert bits developed to give maximum efficiency with the Mole-Drill (see item 29). The new combination alloy achieves optimum results with inexpensive blasting agents and trims drilling costs, regardless of the hardness and abrasiveness of encountered rock. Bit size ranges from 4½-in. to 8-in. diam.

(41) MOTORS: *The Louis Allis Co.* has recently introduced tube-cooled air-to-air heat exchanger motors which are described in bulletin 2400. The units range up to 2000 hp, are built in standard and in explosion-proof construction, and are protected against excessive moisture, dust, sand, dirt, and metallic particles.

(42) CRAWLER-TRACTOR: A comprehensive 32-page book recently published by *The Eimco Corp.* gives full specifications on the tractor, bulldozer, and front-end loaders that compose the Eimco 103 crawler-tractor line. Profusely illustrated, the bulletin includes schematic drawings and coded listing of performance of the equipment. Ask for bulletin L-1097.

(43) AIR COMPRESSORS: *Allis-Chalmers Mfg. Co.* has issued a comprehensive catalog covering the performance and engineering data on its scroll casting design single-stage centrifugal compressors for air applications. The loose-leaf catalog includes formulas for sizing the firm's B, C, and D style units, dimensional data and prices, and 123 performance curves. Copies are obtainable by direct request on your company letterhead from *Allis-Chalmers, Milwaukee 1, Wis.*

(44) MOTOR CATALOG: A very comprehensive motor catalog has been issued by *Sterling Electric Motors Corp.* This illustrated 56-page catalog describes a-c multi-shielded motors and provides complete pricing and dimensional data. Information is also included for various modifications such as specialized mountings and enclosures.

(45) THROTTLE VALVES: Bulletin 460 from *Hose Accessories Co.* illustrates and describes the line of LE-HI Series 2500 throttle valves for the safe control of compressed air on pneumatic operating equipment in mining, quarrying, construction, and general industry applications.

(46) POWER SHOVEL: A 20-page catalog from *The Theo Shovel Co.* describes the ¼ yd crawler-mounted Lorain model 28. The booklet gives details of the machine's construction and job applications for use as shovel, crane, clamshell, dragline, hoe, and other uses.

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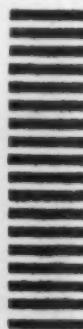
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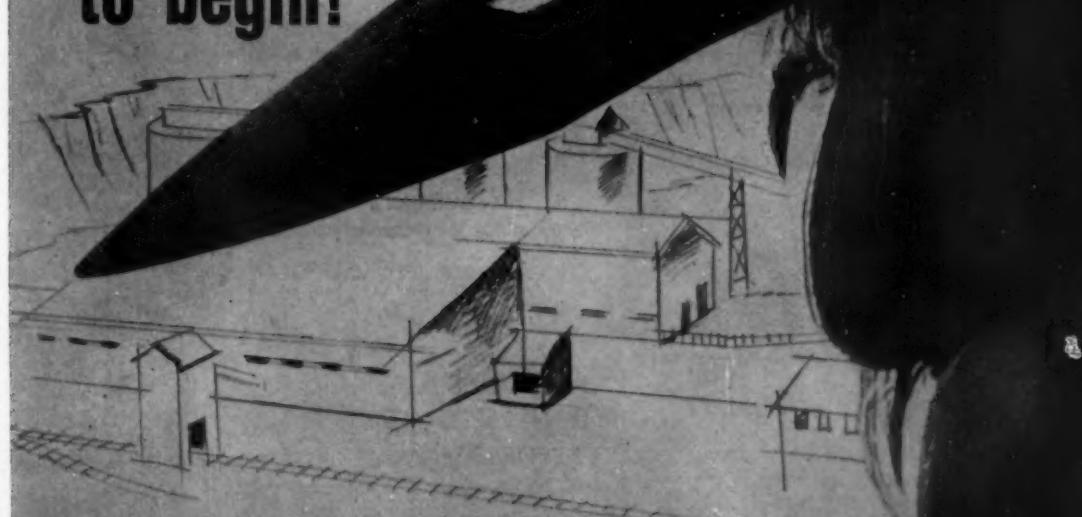
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JULY 1960
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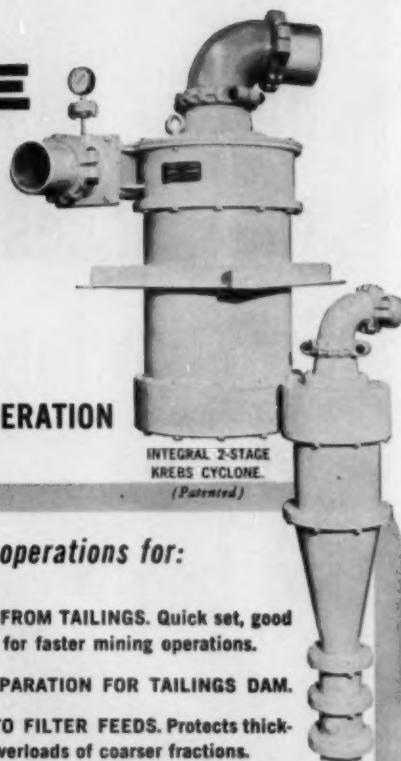
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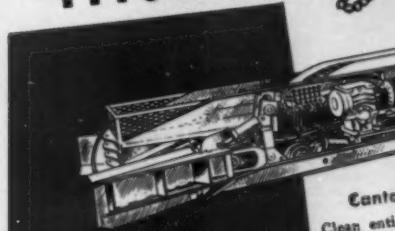
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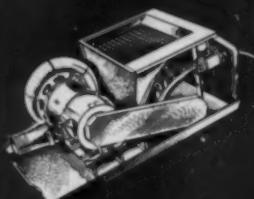


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Mighty Midget Duster

Weights only 280 lbs. Easily moved on shuttle car. Hand cart available. Ideal for small mines—Inexpensive—capacity 7 tons dust per shift.

Dustmaster

The track mounted Hi-pressure "Dustmaster" is the most powerful Duster ever built. Distributes dust to back areas 500 feet from haulway.



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Rubber tire model 22½" high-skid model 18½" for shuttle buggies, belt or mine cars; hydraulic self-propelled belts model available. 34 to 66 lbs. dust per minute through 30 to 250 ft. of 2" hose.

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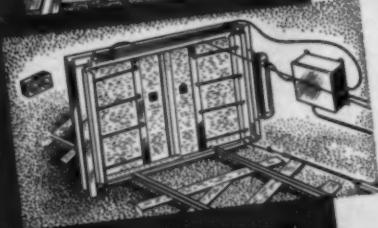
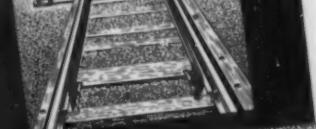
No alterations to track—quickly installed and relocated—less rib to shoot than for jump switch—no hazards of cherry picker, anti-friction bearings for easy hand operation.

Air Power Car Transfer

One man does the work of three and faster. Entire train loaded out on a single track. Expedites servicing cars to mucking machine.

Canton Automatic Mine Doors

The Automatic Door operates mechanically by weight of car on activating levers. Air power operation may be had where desirable. Operates at any trip speed. Two doors provide air lock.



Track Switch Thrower

Either electric or air operated. Route selections made by motor-man at full trip speeds. Eliminates accident potential and extra man. Also ideal as Derailer. Manual or automatic contactors available.

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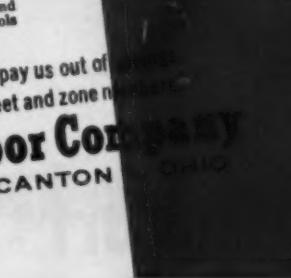
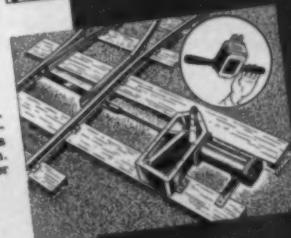
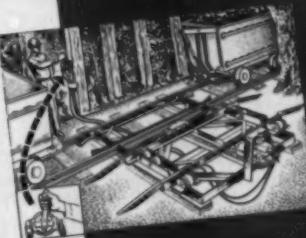
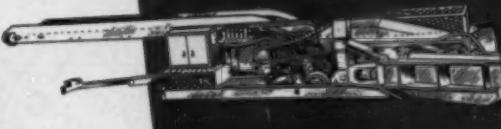
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ABSTRACTS

Continued from
page 641

Water Controlling Factor of Copper Production by S. D. Michelson, B. H. Ensign, S. J. Hubbard, and A. W. Last—The copper industry, which must depend on an adequate water supply if it is to grow, faces the problem of being caught in its environment. About 80% of the country's primary copper is produced in the semi-arid region of the West and Southwest. Competition for use of the limited water supply is keen. The authors summarize the problem and suggest solutions. Ref.: (MINING ENGINEERING, July 1960) AIME Trans., 1960, vol. 217, p. 674.

Bureau of Mines Completes Organization for Mine Research by Paul T. Allman—The U.S. Bureau of Mines recently completed organizational changes that, for the first time since the beginning of World War II, re-emphasize mining research as an important part of its responsibilities. The article gives a progress report on the Bureau's improved program for mining research. Ref.: (MINING ENGINEERING, July 1960) AIME Trans., 1960, vol. 217, p. 675.

Silver in a Time of Change by Edward Sampson—Consumption of silver both for monetary and industrial use in the Free World at present exceeds production. The consequences this state of affairs will produce in the future, as well as possible remedies, are considered in this article. A very brief background on the history of the industry is also provided. Ref.: (MINING ENGINEERING, July 1960) AIME Trans., 1960, vol. 217, p. 676.

A Special Report on The International Mineral Processing Congress by H. R. Spedden—As official AIME representative at this Congress held in London, the author reviews the highlights of the technical program. The report contains abstracts of the most important papers and, where pertinent, evaluates these papers. Ref.: (MINING ENGINEERING, July 1960) p. 677.

SME Meeting Papers: The following abstracts of papers presented at SME meetings are given for your information. Preprints of these papers are not available.

An Appraisal of Industrial Minerals of the Pacific Northwest by Richard M. Poole—Industrial minerals represent an important segment in the economy of the Pacific Northwest. During the recent past, the growth pattern of most industrial minerals in the Pacific Northwest has been one of increasing demand. This demand bears a strong relationship to the steadily increasing population and industrial growth, accompanied by a rising standard of living which, in turn, has stimulated new and increasing demands for industrial minerals. Every evidence indicates this demand for industrial minerals in the Pacific Northwest will continue to grow in the future if the economy of our nation remains sound. Assuming a sound economy and a peaceful world environment for the near future, an appraisal of the possibilities of developing the various industrial minerals found in the Pacific Northwest is made. The need for further evaluation of presently known occurrences along with research on the problems of exploration, mining, beneficiation, development of new uses, and marketing of these minerals are also evaluated. AIME-ASM Pacific Northwest Metals and Minerals Conference, Portland, Ore., April 1960.

The Inorganic Chemistry of Boron by George W. Campbell, Jr.—Boron is one of the most versatile of the elements, comparing favorably with, and in many respects even exceeding the versatility of carbon. The chemistry of boron is determined by the structure of the boron atom in which there are three electrons in the valence shell. Hence, in a "normal boron compound", boron forms three covalent bonds in a planar, trigonal configuration. The fourth orbital (or bonding position) of boron is capable of forming a coordinate covalent linkage with an atom or group of atoms which can contribute a share of an electron pair (Lewis acid-base neutralization). It is this Lewis-acid character of "normal boron compounds" which dominates the chemistry of boron. Thus the boron halides, which are the simplest compounds of boron, are strong acids, and boron fluoride has found extensive use as an acid-type catalyst. Boric oxide is

(Continued on page 666)



REALLY SHARP ON TURNS

The all-hydraulic, 20-ton capacity TR-260 makes U turns in less than 26½ ft . . . saves up to 15 seconds per cycle over conventional haulers.

The 230-hp Allis-Chalmers TR-260 turns in less space than any wagon of comparable size. Complete U turns are made in less than 26½ ft. All-hydraulic, 2-stage steering with double-acting steering jacks gives you 2-way power pulling out of full turns. At the shovel and hopper, this kind of turning can save you up to 15 seconds per cycle over conventional haulers.

In addition, the sharp-turning TR-260 also gives you the benefits of KON-TORK differential and plenty of tractor and wagon underclearance to keep you on-the-go.

These are just a few reasons why the 20-ton capacity TR-260 brings you extra profits on your hauling

jobs. Your Allis-Chalmers dealer will give you all the facts on both the TR-260 and the 12-ton capacity TR-160. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

You get double value and lower basic equipment investment when you use the 9.5-cu-yd TS-160 and 17-cu-yd TS-260, the 12-ton TR-160 and 20-ton TR-260 units. Both can be interchanged . . . together they eliminate need for specialized equipment.



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Original liner $3\frac{1}{4}$ " minimum thickness. Worn to $\frac{1}{4}$ " before replacement. No breaking.

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If you are unacquainted with Ni-Hard* mill liner segments, the table below will give you a rough guide to the minimum thicknesses for an initial installation. Thinner liners than these can and are being used based on individual experience, but the thicknesses contained in the chart are suggested as a starting point for the mill man who is thinking about using Ni-Hard liners for the first time.

MINIMUM MILL LINER THICKNESS

MILL DIAMETER	SIZE OF GRINDING BALLS OR RODS			
	1"	2"	3"	4"
6	1.5"	2.0"	2.5"	3.0"
8	1.75	2.25	2.75	3.25
10	2.0	2.5	3.0	3.5

"Ni-Hard mill liner segments are available from authorized producers throughout the country. For the address of the one nearest you, write to Inco."

*Registered trademark

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Chile Asks Greater Investment by Copper Companies

The severe earthquakes which inflicted heavy damage in Chile have prompted President Jorge Alessandri to ask his country's major copper producers to increase their investment by \$250 million in the next four years. In addition, the President has asked an increase of \$40 million a year in copper production—a total which, at the present copper price of 32¢ per lb, would mean producing an additional 125 million lb a year. Both Anaconda Co. and Kennecott Copper Corp. are negotiating with Chile over possible investments exceeding \$250 million—with decisions pending Chilean guarantees on taxes and other financial factors. Anaconda is considering multi-million dollar expansions at its El Salvador and Chuquicamata mines and the construction of a refinery at Chañaral, and Kennecott is planning to spend some \$200 million to boost output at its Braden mine by 100,000 tons a year.

Alcoa Acquires Jamaica Bauxite Option

An option on mining rights blanketing 30,000 acres of prospective bauxite property in Clarendon Parish, Jamaica, has been acquired by Aluminum Co. of America. Output is slated for June 1963.

Cerro Buys Control of Rio Blanco

Cerro de Pasco Corp. has purchased control of Rio Blanco Copper Corp. Ltd., owner of almost all capital stock of a Chilean company with a large indicated orebody near Santiago. Cerro, which has been exploring the property, reports 120 million tons of ore with average grade of 1.58 pct Cu has been indicated to date. Amenable to block caving, the orebody is estimated to hold the equivalent of 1.9 million tons of refined metal. R. P. Koenig, Cerro president, said a decision to bring the property into production will depend on the outcome of already started negotiations with the Chilean government and satisfactory financing Cerro de Pasco shareholders recently approved a proposal to shorten the name of the company to Cerro Corp. The new title should become effective about the first of next year.

Coal Waste Plant to Produce Aluminum Sulfate

North American Coal Corp. plans to construct a new 40,000-ton per year plant for producing high purity aluminum sulfate from coal mine wastes. To be the first of its kind, the \$1 million plant will employ a process developed jointly by Strategic Materials Corp. and North American. The plant will be located at Powhatan, Ohio, and operating by June 1961.

Copper Output at High in April

Refined copper output jumped to a record high in April. U. S. production was at 153,053 tons and foreign output at 173,538 tons.

Open New Katanga Refinery

Union Miniere du Haut Katanga has begun operation at the Luilu copper and cobalt refinery in the Belgian Congo. By early 1961, annual copper output will be stepped up from the present 50,000 long tons to 100,000, and cobalt capacity to 3500 long tons from the present 1750.

Columbia-Geneva to Build New Iron Ore Facility

An iron ore mine and processing plant will be constructed near Lander, Wyo., by the Columbia-Geneva Steel Div. of U. S. Steel Corp. Plans call for the new unit, which will be completed in 1962, to supply pelletized concentrate to the division's Geneva works near Provo, Utah. The facility will have a capacity of 4000 tpd of pellets containing more than 60 pct Fe and will consist of an open pit mine, a crushing and screening section, a concentrating plant, pelletizing plant, water storage and handling system, and loading and shipping facilities.

Warrick Aluminum Smelter Begins Operation

Start-up of the new \$80-million primary aluminum smelter at Warrick, Ind., by Aluminum Co. of America is giving the industry an additional 35,000 tons per year of rated capacity. Only one of five potlines has been completed, pending an increase in market demand for the light metal. The plant's total capacity upon completion will be 175,000 tons annually.

Bigger Load for Projected Copper Slag Plants

Webb & Knapp, Inc. announced that capacities of two steel mills to be erected at Clarksdale, Ariz., and Anaconda, Mont., will each be increased from the originally scheduled 100,000 tons to 350,000 tons. The projected plants are to produce steel by direct reduction from copper slag piles containing about 30 pct Fe.

Active Promotion for Coal Use

S. F. Dunn, president of the National Coal Assn., says his association's proposals to stimulate coal demand include a research program highlighted by plans to construct an \$875,000 laboratory by Bituminous Coal Research, Inc., an affiliate of NCA. With a Federal coal research program also in the making, he said, the industry is "on the threshold of an intense science and engineering effort that can give an upward thrust to coal demand in a relatively short period."

"Safest Mine in North America" . . .

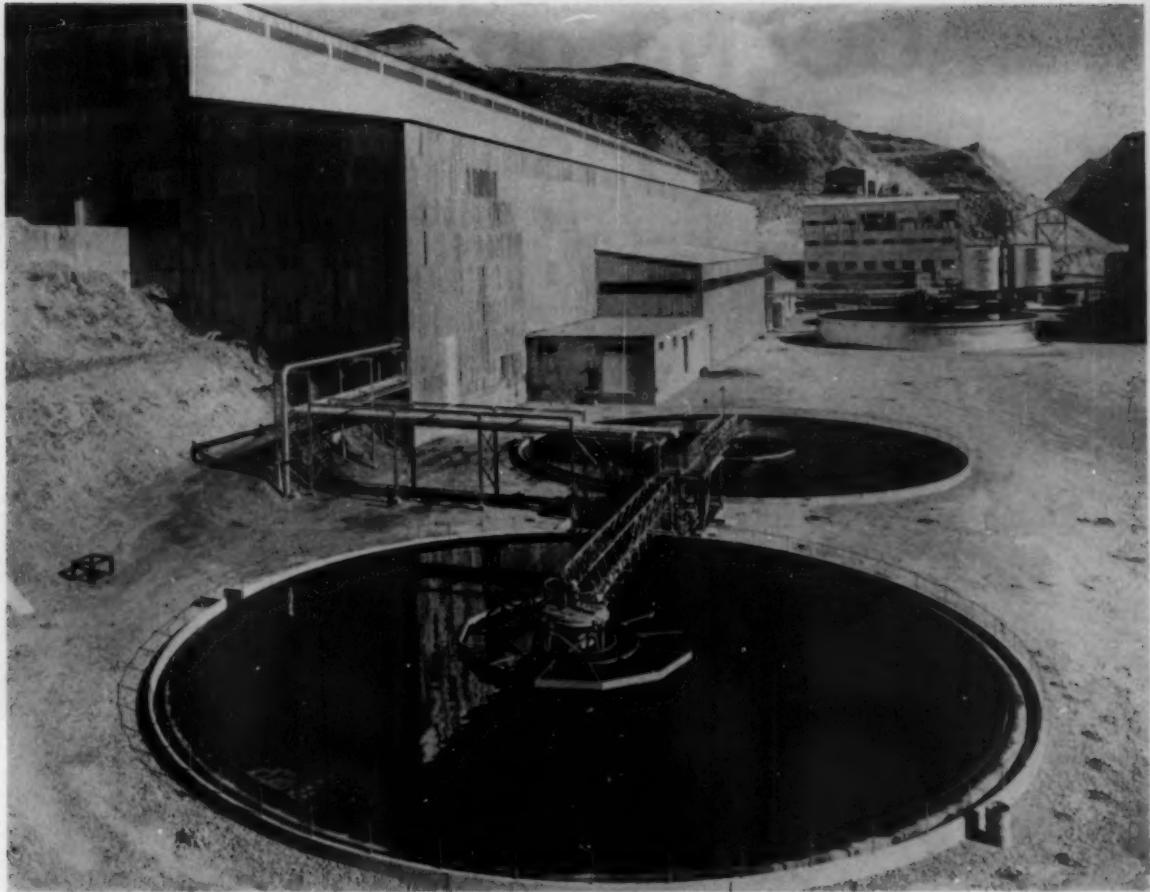
The Jeffrey mine of Canadian Johns-Manville Co. Ltd. in Asbestos, Que., has been given a National Safety Council award of honor. The mine scored the best record for underground nonmetal mining with 2,660,079 injury-free man-hours in the period April 4, 1959, to January 13, 1960.

Kennecott Dedicates Baltimore Refinery

The \$30-million electrolytic copper refinery built by Kennecott Copper Corp. has been officially dedicated. The facility will be operated at its full capacity of 16,500 tons this summer. When the unit goes to full capacity from the present output of 10,000 tons per month, Kennecott will be refining all but 6000 tons of its monthly mine production.

Gilsonite Used for Diesel Fuel

Light-weight mineral gilsonite—a solidified hydrocarbon found in the western U. S.—is being sold by American Gilsonite Co. as a low-cost railroad diesel fuel. The company plans to expand its refinery at Grand Junction, Colo., to meet the anticipated demand.



PROJECT— COPPER

Another Complete Mill-to-Smelter Plant ENGINEERED by STEARNS-ROGER

This smoothly operating project including copper mill, smelter and power plant was designed to process 30,000 tons per day. The engineering performed by Stearns-Roger included designs for concentrator, smelter, heavy density plant, power plant, crushing plant, and specifications for thousands of items of mill and smelter equipment. Engineering of supporting facilities also furnished includes two complete townsites, public buildings, machine and maintenance shops at mine, mill and smelter, transmission lines and lime plant.

Stearns-Roger offers reliability in design, engineering, fabrication, field erection and start-up. One-contract engineering services for your chemical or metallurgical plant project are our specialty.

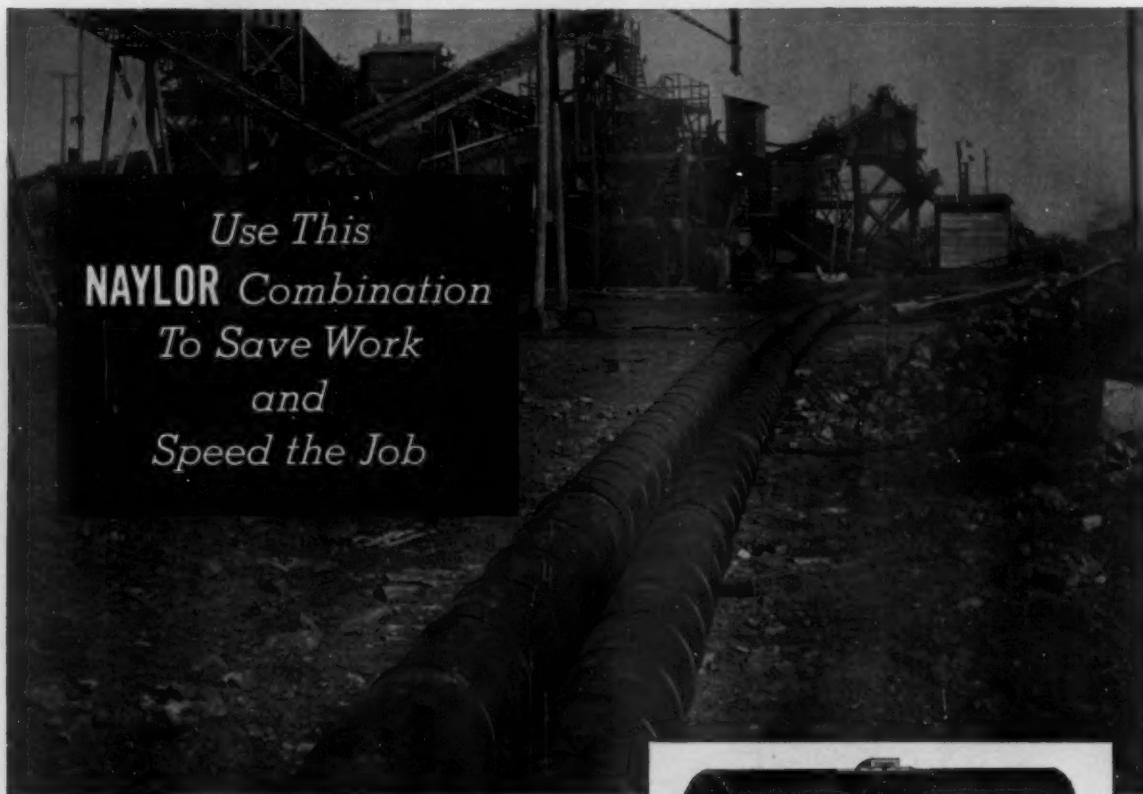


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Speed the Job*



For short cuts to long lines, it will pay you to team up NAYLOR Spiralweld pipe and Wedgelock couplings.

The light weight of NAYLOR pipe makes it easy to install—whether you suspend it, support it, string it along the surface, or bury it.

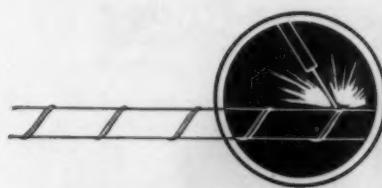
You save even more time when you make connections with the NAYLOR Wedgelock coupling which is designed for faster, easier and more economical installation.

For air, water or tailings service, you'll be time and money ahead to specify this NAYLOR combination.



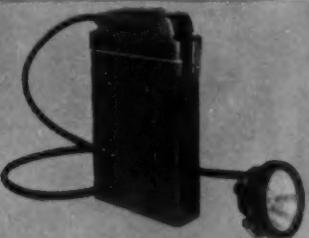
The NAYLOR Wedgelock coupling makes a positive connection, securely anchored in standard weight grooved ends. A hammer is the only tool needed to connect or disconnect it.

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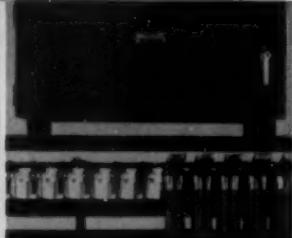


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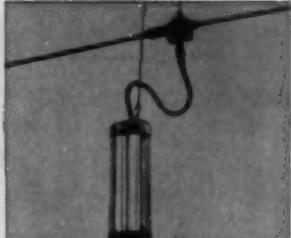
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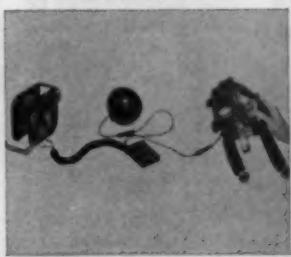
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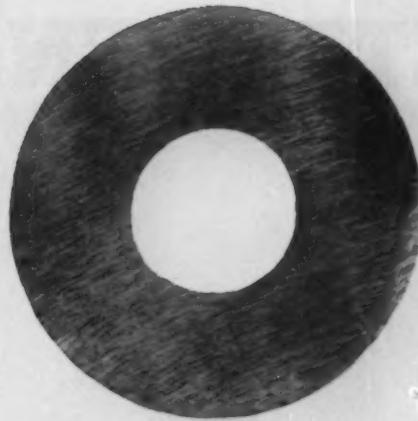


AT-813

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Cross section of average extension steel,
showing distorted center hole.



Cross section of Sandvik Coromant Steel,
showing perfectly uniform center hole.

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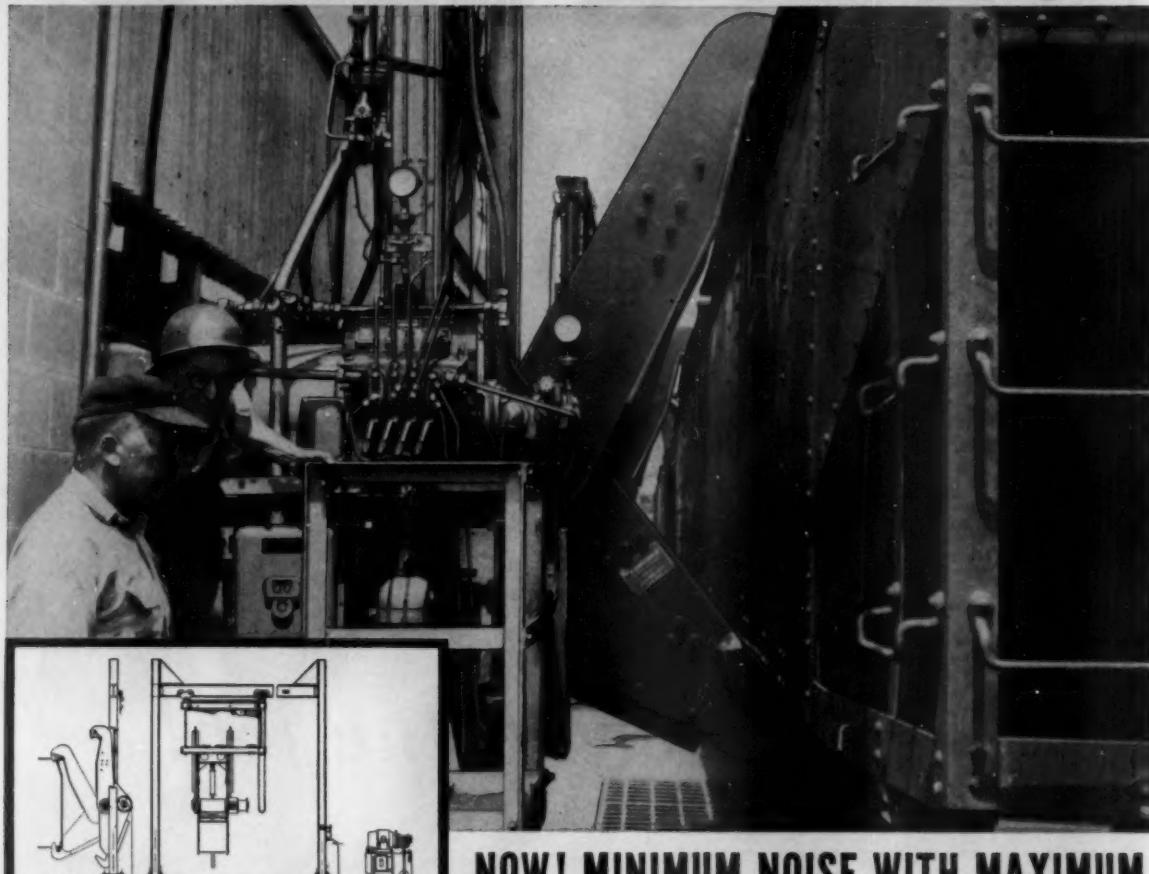
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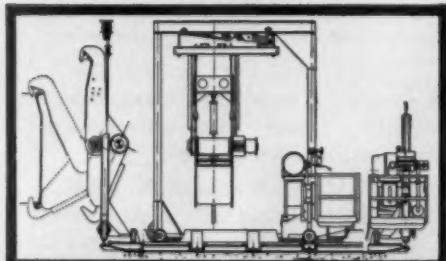
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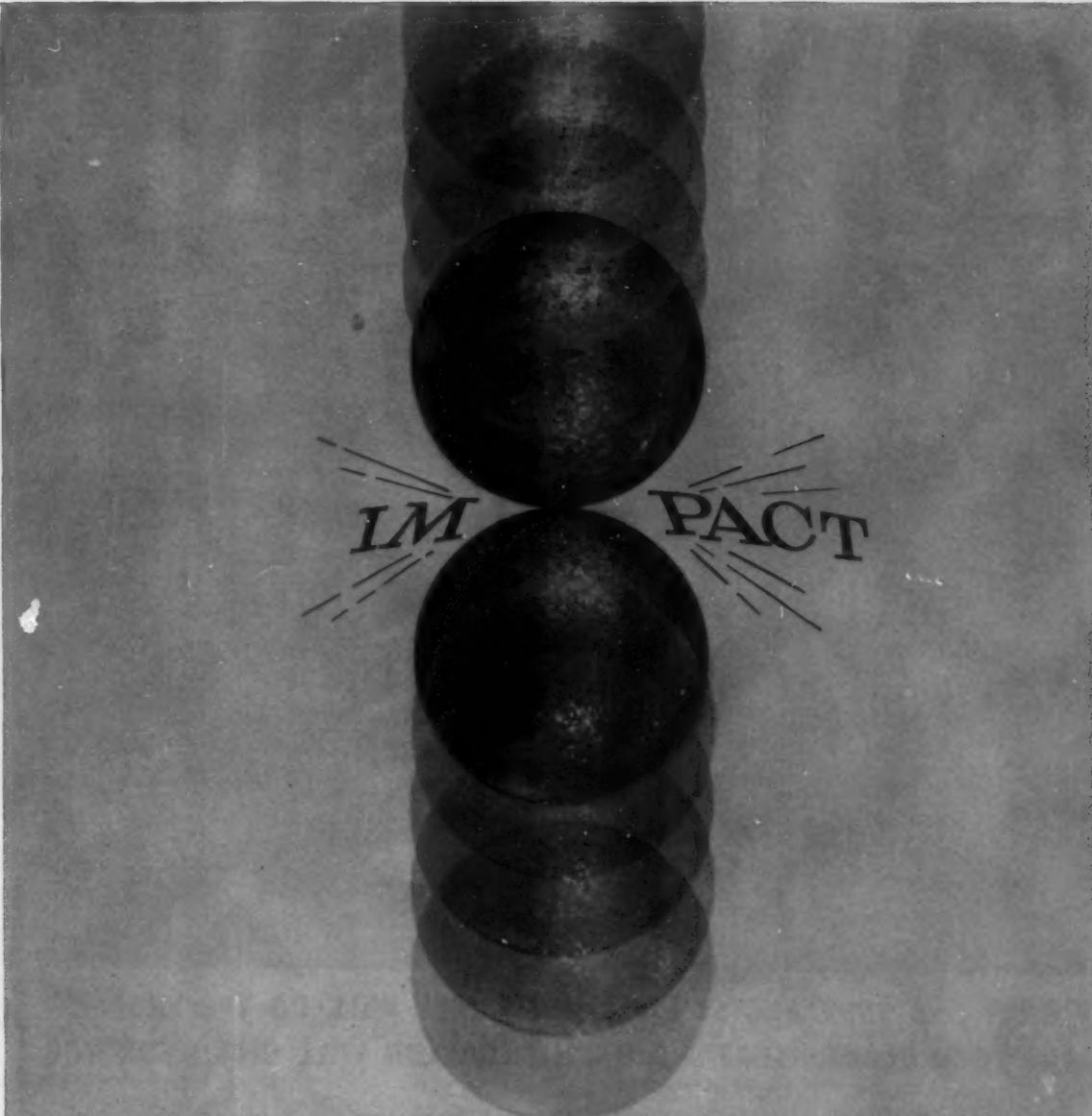


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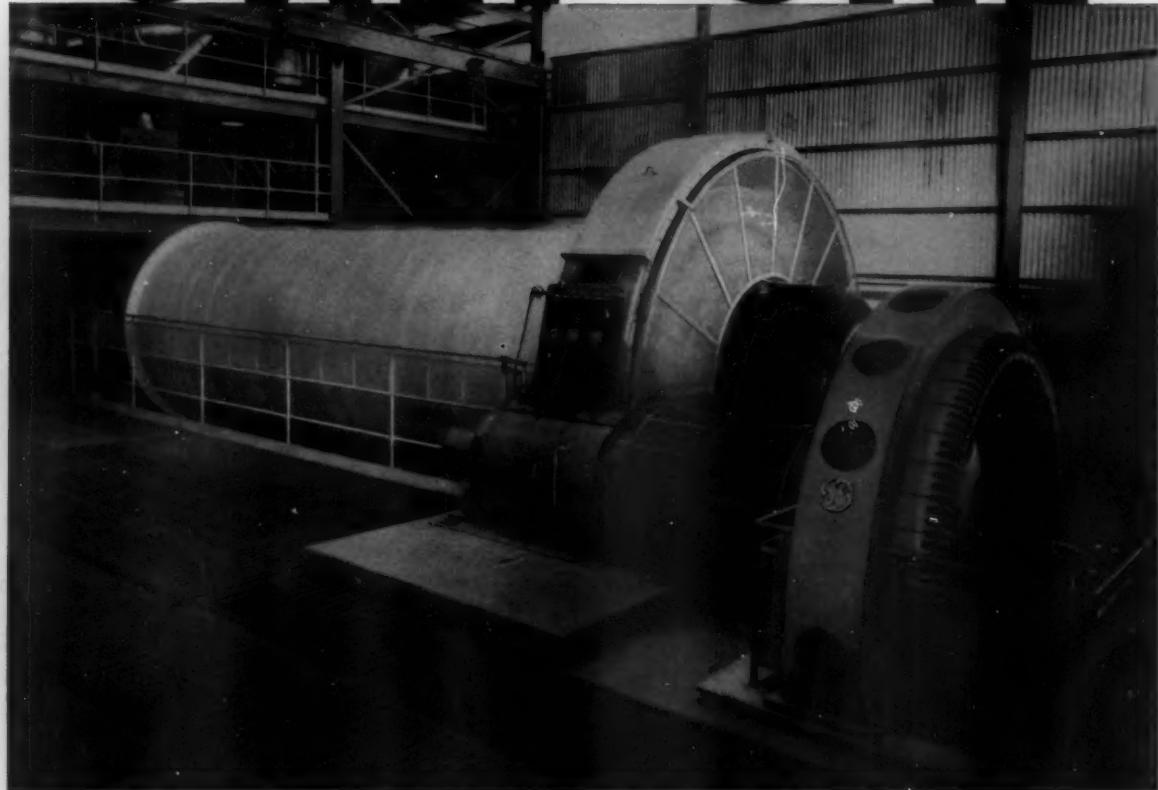
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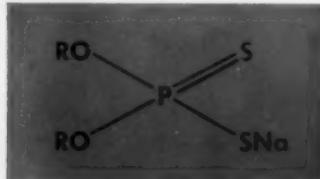
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*Synergistic—of or relating to synergism, the cooperative action of two discrete agencies such that the total effect is greater than the sum of the two effects taken independently.

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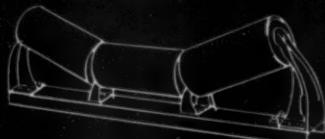
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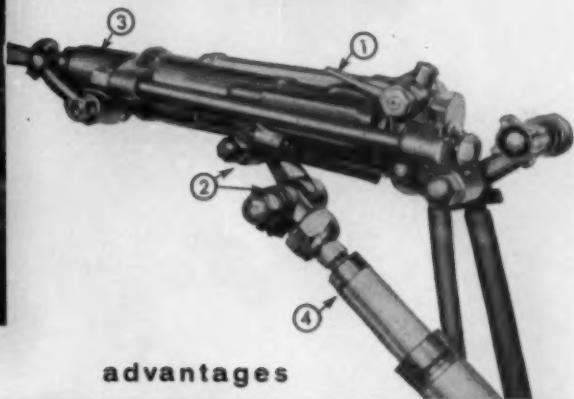


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For driller dependability in a light-weight feed-leg drill, try the new JR-38C. Ask your I-R distributor or engineer for complete information.

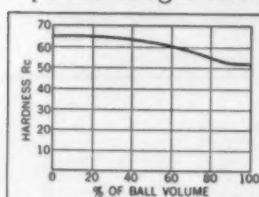
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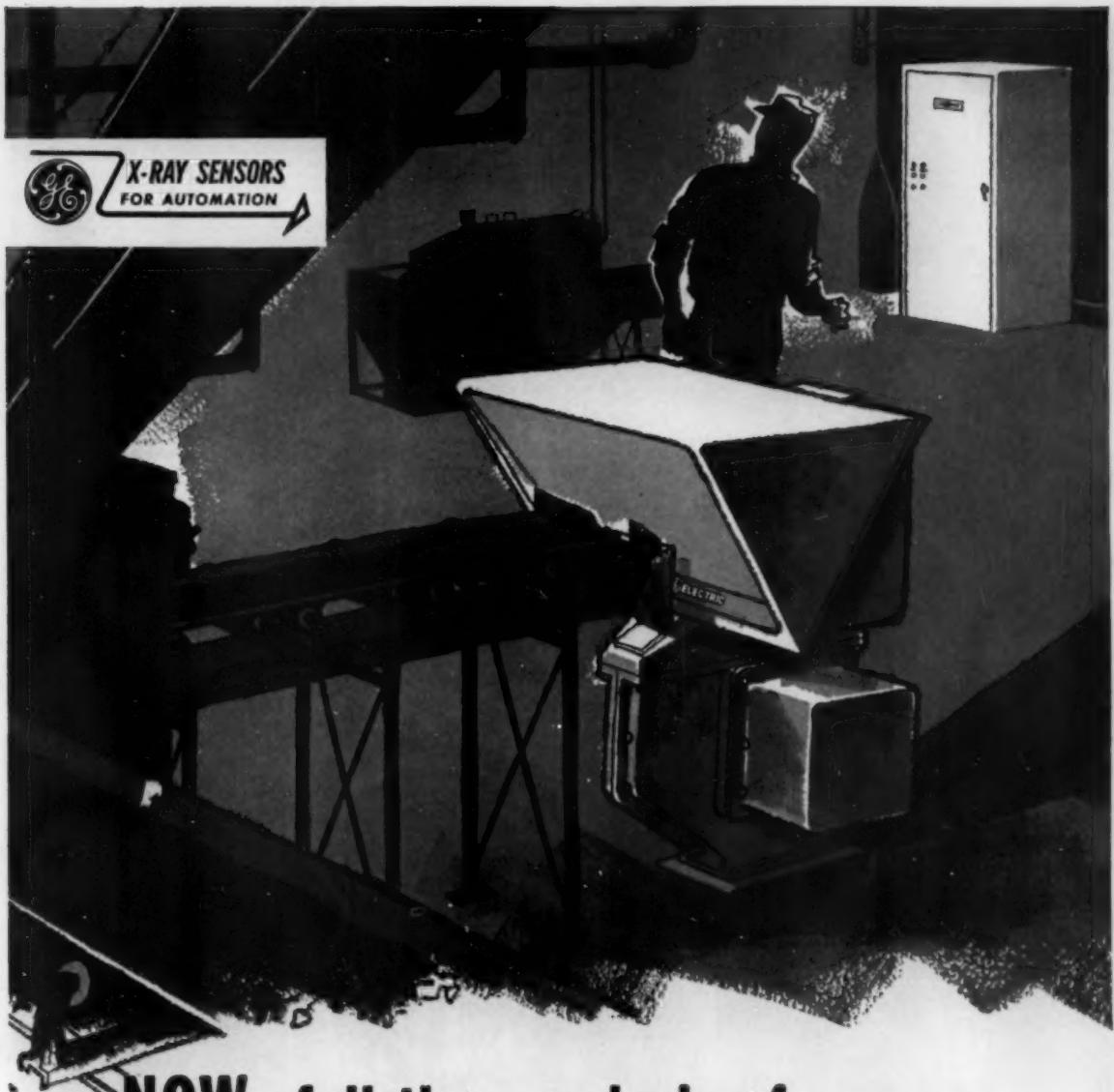
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ABSTRACTS

Continued from
page 648

an excellent solvent, or flux, for metal oxides because of the acid character of the trigonal BO_3 groups that are present. In glasses and ceramic glazes, boric oxide neutralizes the alkalinity of soda and lime, making possible an extended network structure such as exists in fused silica, yet with a relatively low and broad melting range. The chemistry of the boron hydrides, which is a relatively new field of chemistry, is discussed also in relation to the acid character of boron compounds. AIME Southwest Metals and Minerals Conference, Los Angeles, April 1960.

Industrial Minerals of Nevada and Their Future by Robert C. Horton—The development of industrial minerals in Nevada has been, and will continue to be, dependent upon the general development of western industry and transportation facilities. Early production of common salt, using camels for hauling, answered a demand by the mills of the Comstock Lode. Production of borates, soda salts and other raw chemicals also resulted from a demand by the extractive metallurgy industry, at that time the most important industry in the West. With the discovery of more easily recovered deposits and improvements in transportation the production of these minerals all but ceased.

Improved transportation made more distant markets available for other Nevada products. Gypsum, diatomite, barite, and fluorite were produced following World War I. With the continued expansion of western markets other bulk products became valuable. Among these are perlite, silica sand, limestone, and various clays.

Industrial minerals presently produced will continue to find new and larger markets. As other sources are depleted commodities such as cement rock, feldspar, clays, and chemical salts will be produced. AIME Southwest Metals and Minerals Conference, Los Angeles, April 1960.

Economic Geology of the South Ore Body, Pine Creek Mine by Clair M. Kunkel—The Pine Creek tungsten mine is situated in the Sierra Nevada about 20 miles northwest of Bishop, Calif. The outcrops are along a granitic-marble contact at elevations in excess of 11,000 ft.

The oldest rocks are metasediments of probable Cretaceous age consisting of marble, schist, hornfels, and calichornfels. The rocks were intruded by a series of granites at the close of the Nevadan Revolution. The oldest of the granites is a quartz diorite followed by granodiorite and quartz monzonite. The youngest intrusive is a light-colored granite or quartz monzonite with which there is associated numerous aplite, aplite, and pegmatite low dipping dikes. Economic minerals are scheelite, powellite, molybdenite, chalcopyrite, and bornite. AIME Southwest Metals and Minerals Conference, Los Angeles, April 1960.

Application of Mining Geophysics in Western Ore Deposits by Stanley H. Ward—The use of geophysical methods in mining exploration in the State of California prior to 1950 was extremely limited in scope and intensity. Much of this negligible amount of work involved a very casual use of the dip needle in outlining magnetite deposits and black rock units.

Subsequent to 1950, airborne and ground magnetic surveys became common place in the search for the magnetic iron deposits of the Mojave Desert region. However, these latter surveys still represent small percentage of the total geophysical work completed annually in the continental United States. No significant and extended use of geophysical methods has been employed in the search for copper ores, for example. This lack of use of modern exploration techniques largely reflects the low evaluation of the mineral potential of California assigned by major mining companies. Despite this conventional and dismal outlook, not incidentally held by many major steel companies—the very lack of use of geophysical methods, particularly in so-called "saturation prospecting," in the opinion of the writer warrants very serious reflection. Perhaps something has been overlooked.

This somewhat optimistic exploration philosophy adopted by the writer is considered in relation to the new geophysical tools which might be adapted for use in the State of California and to the current intensive

and extensive use of geophysical methods in the search for copper ores in Arizona and New Mexico. AIME Southwest Metals and Minerals Conference, Los Angeles, April 1960.

Percentage Depletion by Glen R. McDowell—The Internal Revenue Code allows a deduction for "percentage depletion" to certain taxpayers engaged in the extractive industry. The amount of this deduction can determine the economic feasibility of ventures in this industry.

There is much controversy between the Treasury Department and the courts concerning the basis for the computation of the percentage depletion deduction. The controversy revolves around the meaning of the terms, "gross income from the property," "gross income from mining," "net income from the property," "ordinary treatment product," and "commercially marketable product." A case on appeal to the U.S. Supreme Court may resolve some of these questions.

While these terms are technical and the computation of percentage depletion is often complicated, the businessman and engineer must have some basic understanding of them. AIME-ASM Pacific Northwest Metals and Minerals Conference, Portland, Ore., April 1960.

Beneficiation of Southwest Oregon Beach Sands by High Tension and Magnetic Dry Processing by J. F. Hunt—The author describes the actual processing of the government stockpile of chromiferous sands, located at Coquille, Ore., during 1955 and 1956. A general history of the stockpile is given, along with a background of the geology and origin of these sands. The flow sheet used in this operation is outlined in detail, and the minerals won from the stockpile by high tension and magnetic processing are discussed as to their purity and saleability. Among these minerals are chromite, ilmenite, magnetite, zircon, garnet, rutile, monazite, gold, and platinum. Planned post-stockpile operations on the present beach deposits are discussed. These operations would have been carried out to set up a continuous integrated mining and beneficiation project, except for unforeseen circumstances which dictated the closing of the operations at the exhaustion of the government stockpile. AIME-ASM Pacific Northwest Metals and Minerals Conference, Portland, Ore., April 1960.



Adv. No. 152

Longyear

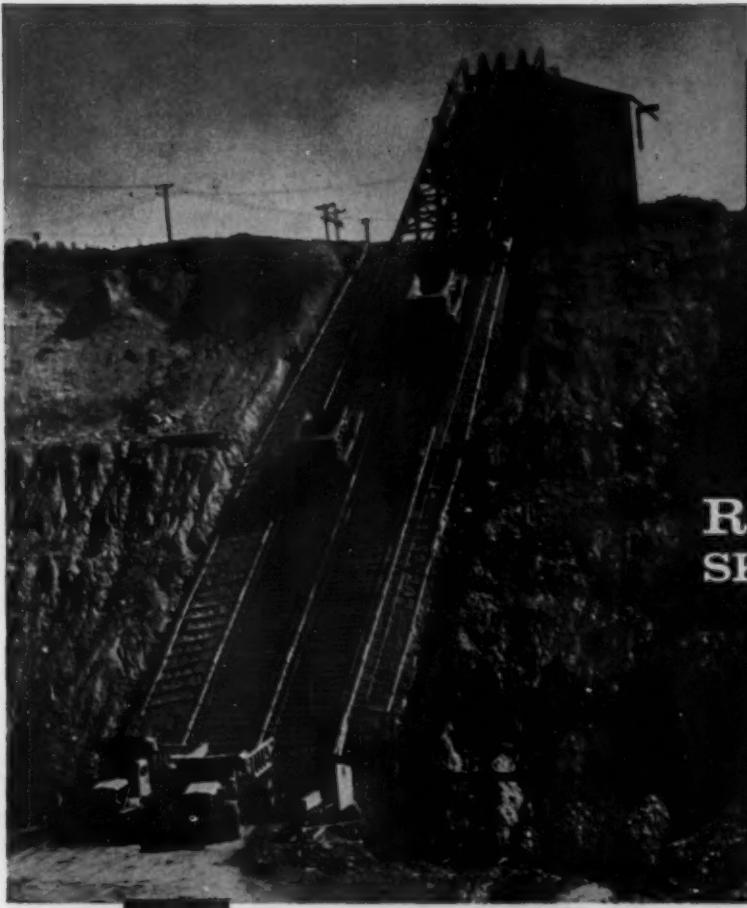
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A HISTORY OF PROGRESS

"In European countries, where the arts of mining and metallurgy have long been the subject of the most careful study, no means have been found so effectual [to promote the arts and sciences connected with the economic production of the useful minerals and metals and the welfare of those employed in these industries by all lawful means] as the free interchange of experience among those actually engaged in these industries; and this object has been accomplished mainly through the medium of 'Institutes', 'Associations', or 'Societies', composed of those engaged in these occupations. . . .

"It must be evident to all practical men that the interchange of the varied experience of those engaged in such occupations in this country, could not fail to advance very materially the desired objects; it is therefore proposed to establish an American Institute of Mining Engineers

So read the original call to American mining engineers in April 1871. One month later, May 16, 1871, the American Institute of Mining Engineers was founded by 22 men who met in Wilkes-Barre, Pa. In addition to founding AIME, these men were also pioneering in American professional societies—for AIME is the second oldest professional engineering society in America. The Society of Mining Engineers of AIME is the direct lineal descendant of the original organization.

Growth and diversification over the succeeding years put the word Metallurgical into the official title in 1919, and most recently, the full-fledged rank of Petroleum was given official recognition in 1956. However, the two most important years in the life of the organization since its founding were probably 1911 and 1949. In the former year, the Institute made changes to foster the effectiveness of the organization. This was the time when the first Local Sections were formed, the first technical committees were organized, the first membership committee was initiated, and the first Committee on Publications was established.

In 1949, the Institute underwent a modernization program to meet the changing conditions within it. The reorganization included many facets: meetings, sections, publications, and creation of the Branch structure. This Branch structure formed three semi-independent groups—Mining, Metallurgy, and Petroleum—and was the foundation on which the Long Range Planning Committee in 1957 was to formalize the present three Societies of the Institute.

"As the membership has increased, and as the scientific interests of the members have broadened and deepened, so has the complexity of the administration of the AIME increased. Reorganization has followed organization throughout the history of the administration. Several of the reorganizations have demanded changes in philosophy as to methods of serving the membership more effectively."

"Long Range Planning for Institute Development", MINING ENGINEERING, June 1956, p. 646.

But the goal of the Institute has not changed materially in its 89 years of existence. The primary mission of AIME—and more specifically, the Society of Mining Engineers—is to serve as a vehicle for the dissemination of news and technical information among all members of the mining industry. From corporation presidents to engineering trainees trying to find their way out of a labyrinth of drifts and stopes, the Society of Mining Engineers provides a common and natural meeting ground for the free interchange of theories, thoughts, and experience by which all those who desire may profit.

The roster of members of the Society of Mining Engineers included in this issue is, in a sense, a progress report on the Institute's growth. Rixford A. Beals



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ANACONDA UNDERTAKES DEVELOPMENT PROGRAM

REPORT ON SELECTIVE MINING OPERATIONS AT BUTTE

While mining silver at Butte in 1882, Marcus Daly is reputed to have told his partners in The Anaconda Silver Mining Co., "It looks rather gloomy. The vein is running into copper." Recently, The Anaconda Co. authorized an \$11 million expenditure to be made over the next five years to ensure their "running into copper" at deep levels for many more years. The new development program is designed to permit both deeper and more widespread selective mining in "the richest hill on earth" by means of additional shaft-sinking, reactivating closed mines, and establishing new haulageways and centralized hoisting facilities.

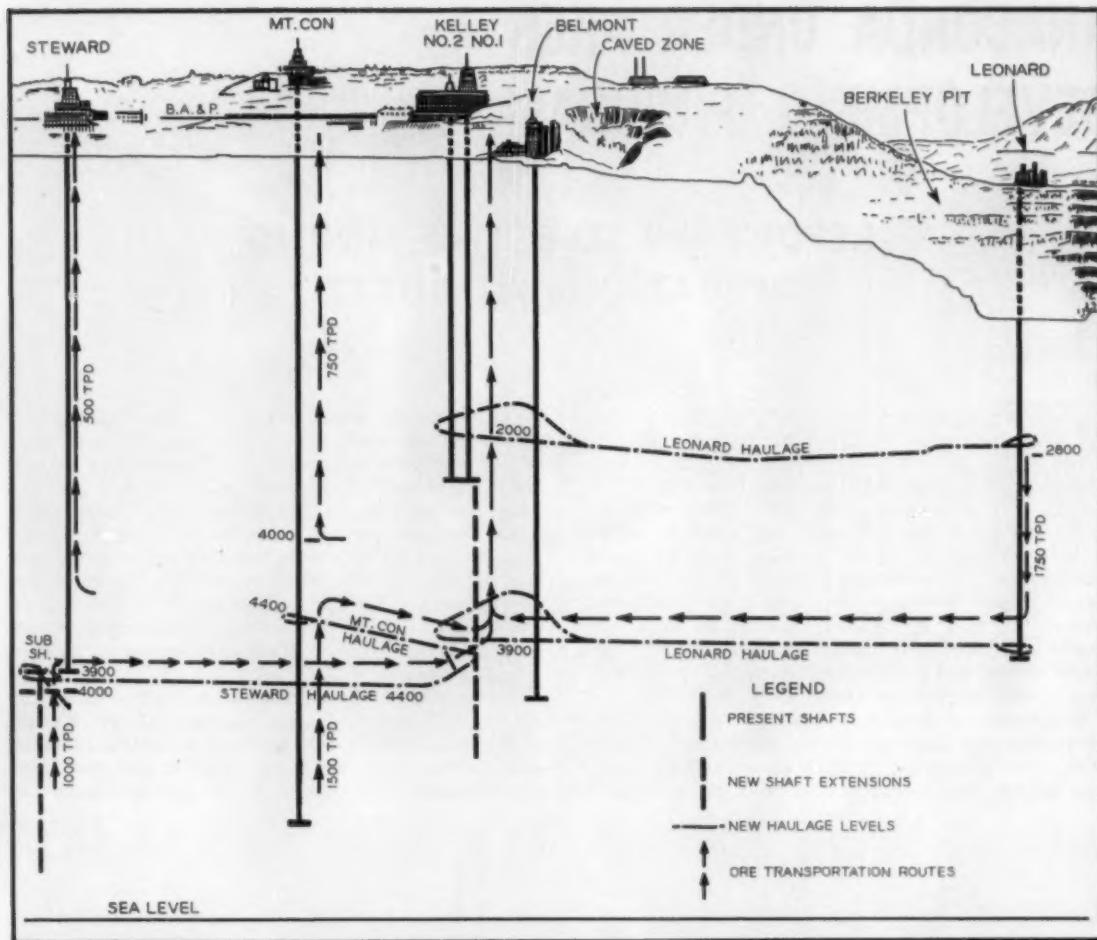
Historically a deep level selective mining camp, Butte will now continue its uncommon use of three main types of mining methods at one camp—selective mining, block caving, and open pit mining. It

was thought by some people that the construction of the Kelley shaft and the subsequent beginning of block caving operations in 1952—outgrowth of the Greater Butte Project—signaled the end of stope mining of high-grade ores at depth. This feeling became more pronounced when, in 1957, the Berkeley open pit commenced operations. During recent years, the tonnage of ore mined selectively underground has decreased, but the new program will maintain the position of selective underground mining in the overall picture of the Butte operations for many years to come.

The key to initiation and success of this program lies in the large hoisting capacity of the Kelley shaft No. 1, which will serve as a central hoisting shaft for the deep-level, selectively mined ores from the Mountain Con, Steward, and Leonard mines as



The Tuolumne shaft, shown under construction in the foreground, will serve as the central pumping station. Behind the Tuolumne rises the tower of the Modoc shaft which is to be the central exhaust ventilation station of the mines.



Plan of operations.

well as for ore from the continuing block-caving operations nearer the surface. The Ryan shaft—a deep-level centralized hoisting project—was previously considered, but the drop in the copper market in 1956 forced the project's abandonment. The new large-scale program is a more economical approach to accomplish centralized hoisting and haulage of vein-type ore.

Five major projects will be undertaken to put this new mining program into effect:

- 1) Deepening the Kelley No. 1 shaft to the 4600-ft level and converting it to a central hoisting shaft.
- 2) Deepening the Steward shaft to the 5000-ft level via a sub-shaft.
- 3) Driving haulage ways from the Kelley shaft to the selective mining zones of the Steward, Mountain Con, and Leonard mines.
- 4) Constructing new central pumping through the Tuolumne shaft.
- 5) Constructing a new exhaust ventilation outlet through the Modoc shaft.

In addition to the above, the Belmont mine, closed since the latter part of 1956, may ultimately be re-opened and connected with the Kelley haulage and hoisting system.

Such mine planning must carefully integrate the three methods of ore extraction at Butte. The selection and location of new centralized ventilating and pumping installations required consideration of future open pit encroachment as well as potential subsidence due to block-caving operations. Dumping of waste material from the Berkeley open pit eliminated still other areas for potential long-range shaft life. Unique solutions to these problems have been found, and The Anaconda Co.'s recent announcement in Butte that deep level mining will be extensively reactivated indicates successful economic solutions to the technical problems involved.

No time has been lost in getting the new program under way. The Tuolumne shaft is presently being enlarged and concreted to serve as the new central pumping shaft for removing water from all the mines. Initial work in the Steward shaft has commenced and shaft-sinking operations in the Kelley mine will begin later this year.

UNDERGROUND CONSTRUCTION

The Kelley mine has two shafts—a large five-compartment hoisting shaft (shaft No. 1) and a smaller, slightly shallower service shaft (shaft No. 2). The new underground mining program requires sinking of shaft No. 1 an additional 1718 ft to the

4600-ft level. The shaft, largest of its type in the U.S., measures 38x10 ft in rock section and about 35x7 ft concreted. It will handle approximately 4250 tons of ore raily from the Steward, Mountain Con, and Leonard mines plus additional tonnage from the block-caving operations at higher levels.

Kelley shaft No. 2 now provides service to the 3000-ft level and present plans do not indicate that it will be deepened. Such shaft sinking is not required at this time because the existing shafts at the Mountain Con and Steward mines will provide service to the deepest level of these mines.

Haulageways for trammimg ore from the Mountain Con and Steward mines will be driven from the 4400-ft level of the Kelley; haulage from the Leonard will be via a 6450-ft long cross-cut on the Kelley's 3900-ft level. These haulageways are designed to accommodate the large underground motors and cars of the type now being used in block-caving operations in the upper levels of the Kelley mine.

Present focal point of interest in the Steward mine is on the 3900-ft level, where an engine room has recently been concreted. The room is 45 ft long, 33 ft wide, and 23 ft high and houses a 600-hp double-drum hoist to service sinking operations on the Steward sub-shaft. This hoist had been dismantled on the surface and lowered to the engine room where it was reassembled.

The Steward sub-shaft will require two years for completion. This three-compartment concreted shaft provides in effect a 1300-ft extension to the present Steward shaft. To bottom at 5042 ft, it will make the

Steward mine slightly deeper than the present Mountain Con, now Butte's deepest at 4996 ft.

DEEP-LEVEL MINING PLAN

The general scheme of the new underground operations is shown in the accompanying diagram. Although the Kelley shaft No. 1 will serve as the central hoisting system, the shafts of the Steward and the Mountain Con mines will also be used to hoist ore from their own middle and upper levels. The diagram shows the potential flow of 5500 tons of ore per day from the selective mining operations when the project is completed.

At the Steward and Mountain Con, all ore mined below the 4200-ft horizon will be trammed over the 4400-ft main haulageway to the Kelley hoisting shaft. Approximately 1000 tpd from the Steward and 1500 tpd from the Mountain Con will be hoisted at the Kelley shaft. All ore extracted above the 4200-ft level in these two mines will be hoisted up their own existing shafts. It is anticipated that the Steward and Mountain Con will transport 500 and 750 tpd respectively in this manner. By relieving the hoisting installation at these two shafts from hoisting ore from extreme depths, it will be economically feasible to reactivate a selective mining program in ore zones at medium depths in both mines.

Mining operations to be conducted in the reactivated Leonard mine will differ from those in the Steward and Mountain Con mines because future subsidence will necessitate closing-off the upper levels of this shaft. A bulkhead will seal off this upper portion above the new service entry which has been driven on the 2000 ft horizon from the Kelley shaft No. 2. Ore from the Leonard will be transferred



Interior of the new engine room being constructed on the 3900-ft level of the Steward mine. The room will house an 600-hp double-drum hoist to service sinking operations of a new sub-shaft. The shaft will reach a 5042-ft depth. Cable from the hoist will pass through the opening of the 105-ft-long raise shown in the upper center of the picture.



The 600-hp hoist for use in the shaft-sinking operations in the Steward mine is being dismantled on the surface prior to its transfer to the new underground engine room. After the Steward sub-shaft is sunk, the hoist will bring up ore from the deep-level mining operations to the 4400-ft haulage level for tramsing to the Kelley central hoisting shaft.

by ore-pass to the 3900-level haulageway and transported to the Kelley hoisting shaft.

VENTILATION AND PUMPING SHAFTS

Surface subsidence due to block-caving operation, the gradual extension of the Berkeley pit, and the growing waste dumps from open pit operations have dictated the location and design of the new ventilation and pumping facilities which will service all underground mining operations in Butte. The Modoc shaft and the Tuolumne shaft will serve respectively as ventilation shaft and pumping shaft. These two shafts will be unique because the top of each has been constructed to extend more than 150 ft above the original ground surface.

Pumping Shaft: The High Ore shaft, employing a 3800-ft drainage level, now serves as the central pumping shaft for underground mines. However, the upper part of the shaft is being encroached upon by surface subsidence. To provide a new central pumping shaft with the promise of many years of useful life, the old Tuolumne shaft is being deepened, enlarged, and concreted. A five-year project that has already been started, the shaft will be extended downward from its present 3000-ft depth to the 3900-ft horizon. At this point it will be connected to the existing 3800-ft level drainage system by driving an 1800-ft cross-cut.

The Tuolumne shaft is located on the east side of Butte Hill in an area now used for dumping waste material from the Berkeley pit. As open pit operations continue, this dump has risen 150 ft above the present surface. To allow for this, a 160-ft high concrete tower and collar has been constructed on top

of the old shaft. A Koeppe-type hoist will provide service to the top of the pumping installation.

The present pumping system at the High Ore mine employs a four-stage water lift. Water is pumped from the present 3800-ft drainage level to the 2800, 2200, 1200-ft levels and then to the surface. When the new pumping shaft is put into operation, it may utilize large-capacity pumping equipment capable of handling water from the 3900-ft level in just one lift. If present plans are carried out it is expected to be the deepest one-lift pumping installation in the world.

Ventilation Shaft: The historic Modoc shaft is being prepared as the new air shaft for underground operations. The block-caving operations with resultant surface subsidence required selection of a shaft some distance from the main exhaust collection point underground.

The Modoc, a 16-ft diam shaft, has been sunk 980 ft. From its bottom, dual horizontal airways have been extended 700 ft to another 16-ft diam shaft that is located completely underground. The secondary shaft has been extended downward an additional 480 ft to take the exhaust air course outside of future subsidence areas. A concrete tower similar to the one being constructed on the Tuolumne shaft will top the Modoc.

CONCLUSION

To say that Butte has received a new lease on life is erroneous. The importance of this new program lies in its making economically accessible the high-grade vein deposits that are known to exist at depth. Assuming proper economic conditions in the copper industry during future years, selective mining will continue in Butte for many more decades.

BENEFICIATION OF AGGREGATE BY HEAVY MEDIA SEPARATION

by DONALD W. JENKINSON

The cement aggregate industry has adapted heavy media separation to upgrade many deposits which heretofore have been unacceptable for use. This article is a brief report on the growth of this interesting and relatively new application of gravity concentration.

Many types of gravity concentration equipment have been employed throughout the years since beneficiation of materials has been practiced. These include jigs, concentrating tables, vanners, sluice boxes, heavy media cyclones, and static heavy media separators or sink-float separators.

In the beneficiation of coarse aggregate for concrete mixes, static heavy media separation employs the same principles of gravity concentration involved in separating lead-zinc ore, dolomite, limestone, diamonds, manganese, iron, and many other minerals. In aggregate beneficiation, as in most metallurgical operations, sink or heavy fraction is the product. The undesirable portion of coarse gravel is usually much lighter than the desirable particles, allowing most aggregates to be amenable to gravity concentration methods.

Heavy media separation was first applied to aggregate on a commercial scale in 1948 at Rivers, Manitoba, in connection with airstrip runway construction. This method of separation was economically justified when the capital expenditure and operating costs of the process were balanced against an approximate freight rate of \$2.50 per cu yd for aggregate from the nearest acceptable commercial gravel pit.

Since this first plant was built, the use of heavy media separation in the cement aggregate industry has grown steadily. To date, 27 additional plants employing this technique have been constructed. Geographically, the majority of installations are concentrated in Michigan and the surrounding areas of Ohio, Minnesota, and Illinois. In addition, there are three installations in Canada, four in California, and four in Utah. All of these plants are located in areas which have at least one of the following characteristics:

D. W. JENKINSON, Member AIME, is with Western Machinery Co., San Francisco, Calif.

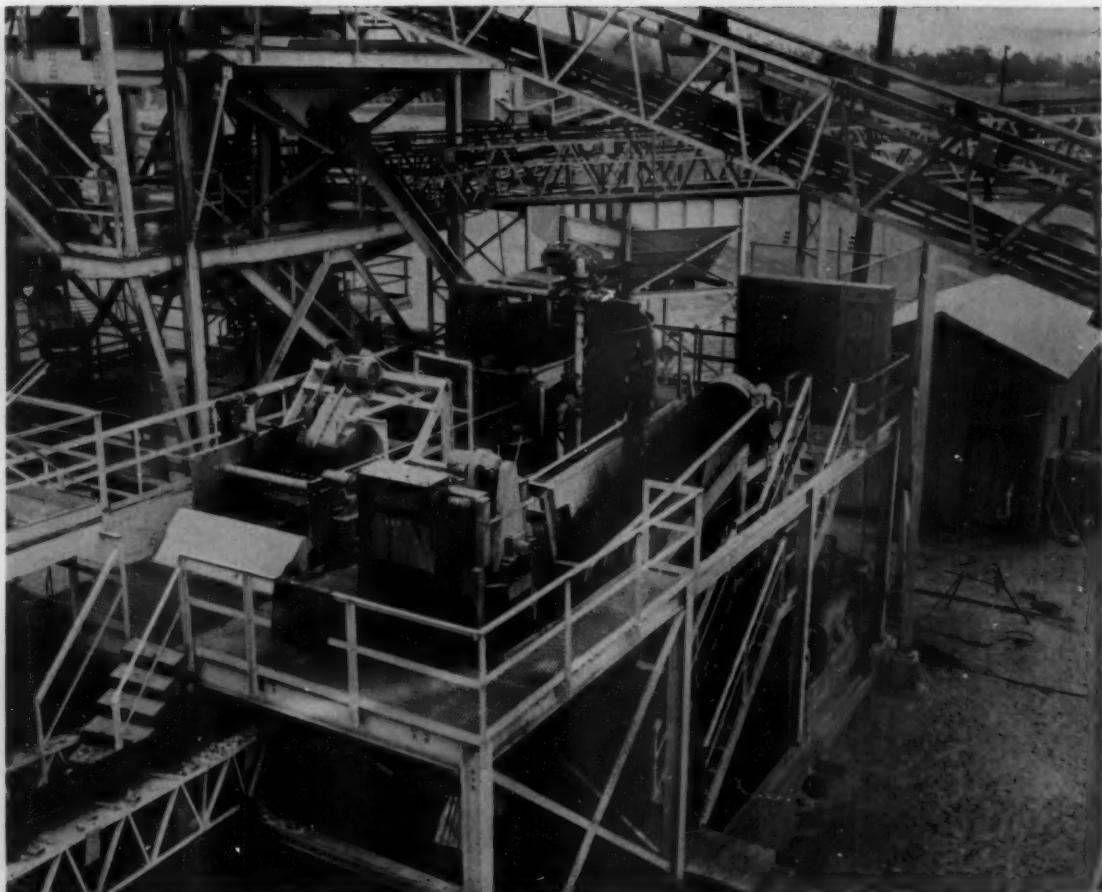
1) Gravel beds containing a high percentage of deleterious material, generally in regions of extensive glacial deposition.

2) Concrete structures subjected to frequent freezing and thawing cycles.

The advantages of processed aggregate are many, but the most important is its contribution to the durability of concrete. It is well known that a soft, nondurable stone will cause imperfection and early failure in concrete, but it is not so apparent that some hard stones may also cause imperfections. These hard stones, termed *absorbent* in the aggregate industry, will expand and disintegrate when subjected to moisture and freezing, particularly at or near the surface of the concrete structure.

Specifications of Aggregate: Specifications now in practice for determining the quality of coarse aggregate are not generally compatible with a gravity analysis, as most of them were written before beneficiation was introduced to this field. Furthermore, specifications vary according to local and state requirements. Ordinarily such specifications are written to limit the percentage of individual stones that are classified as *deleterious*, as well as the total or combined deleterious material allowed in the product. A deleterious classification may contain organic materials, chert, clay, soft and nondurable particles, hard and absorbent particles, shale, coal, lignite, and many other particles not specifically identified. Presently, the percentage of deleterious stones is usually determined by visual inspection and identification.

Heavy Media Separation: For those projects where use of coarse aggregate subjected to heavy media separation is economical, the desired (or required) specifications of an aggregate sometimes place a heavy burden on the aggregate producer as well as the manufacturer of gravity concentration processing equipment. The major problem is to in-



A heavy media separation plant constructed by Western Machinery Co. for the processing of coarse aggregate.

egrate these specifications into a function of the gravity analysis of the desired products. If the desired specifications can be met by skimming the very lightest-weight fraction of the deleterious material such as organic material, coal, and shale, the separation is relatively easy. However, when it becomes necessary to remove chert, iron-bearing stones, or other materials which may not have a clearly defined density, the problem is more difficult and an analysis must be made to determine the specific gravity of acceptable and unacceptable particles.

In the latter category it is generally necessary to make a very sharp separation at a predetermined specific gravity. This must be done not only to obtain maximum recovery, but also to meet rigid specifications. When the density of a deleterious particle approaches the density of the sound stones and a sharp separation is not made, it has been found that in a liquid where the separating gravity is greater than the specific gravity of the stones, good stones are rejected at a faster rate than the unsound or deleterious particles. Thus deleterious materials may be concentrated in an intermediate or middling gravity range which, unless the middlings are removed, may cause serious dilution of the desired concentrate or sink material.

On two dam projects, the Glen Canyon Dam and the Flaming Gorge Dam, it was determined that aggregate heavier than 2.50 sp gr would make a satisfactory concrete. A specification was then written to

allow not more than 2 pct material lighter than 2.50 sp gr in the coarse aggregate. At another project where similar tests were conducted on locally available aggregate, it was determined that 0.25 pct was the maximum allowable light-weight material.

This type of specification is much easier to work with, and sharpness of separation becomes of paramount importance in producing the specified sink product while keeping the amount of sink particles in the float to a minimum. Field measurements can readily determine if specifications are being met and can be used to evaluate efficiency of the operation.

In recent years the U.S. Bureau of Reclamation has written specifications adapted to the capabilities of commercial equipment and the common practices in making gravity separations. In specifying the amount of light-weight material (the deleterious fraction) permitted in the concrete aggregate, the Bureau offers a readily measurable ratio, which may be determined by immersing the sample in a heavy-liquid bath and then weighing the total amount of float material.

The application of heavy media separation by aggregate producers has permitted the use of many gravel pits which, in their natural state, contain too high a percentage of deleterious material to be of value to the construction industry. Upgrading these deposits by gravity concentration has permitted such gravel pits to economically supply suitable quantities of coarse aggregate.

MAN-CARS AT IDRIA

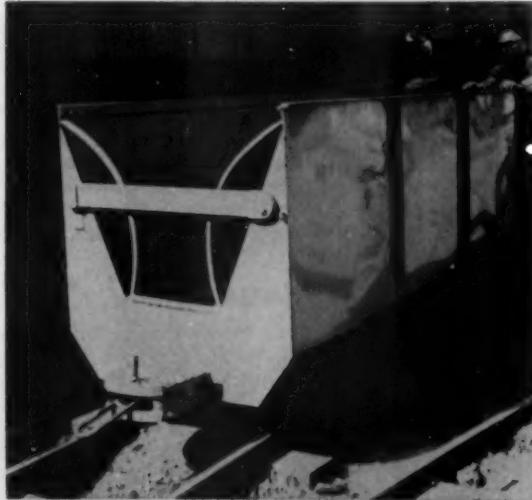
by FRANK S. HURLEY, JR.

To comply with the California Mine Safety Orders pertaining to transportation of mine workers over mine railroads, the management of the New Idria mine in San Benito County, Calif., designed special man-cars. The new regulations, dated October 1958, make it mandatory for mine man-cars to be designed for carrying five or more men to and from the mine workings. At the New Idria mine, largest single producer of mercury in the U.S., each shift normally employs about 70 men. However, with the possibility of a future increase in the work force, seven man-cars were constructed with a total carrying capacity of 84 men.

F. S. HURLEY, JR., Member AIME, is a geologist with New Idria Mining & Chemical Co., Idria, Calif.

The general design of the mine man-cars was dictated by safety regulations plus the physical characteristics of the mine—low headroom, limited side clearance in haulageways, and track irregularities due to ground swells. The cars measure 10 ft long, 44 in. wide, and 50 in. high and were built at an average cost of \$450 per car. All assembly work was done at the mine site.

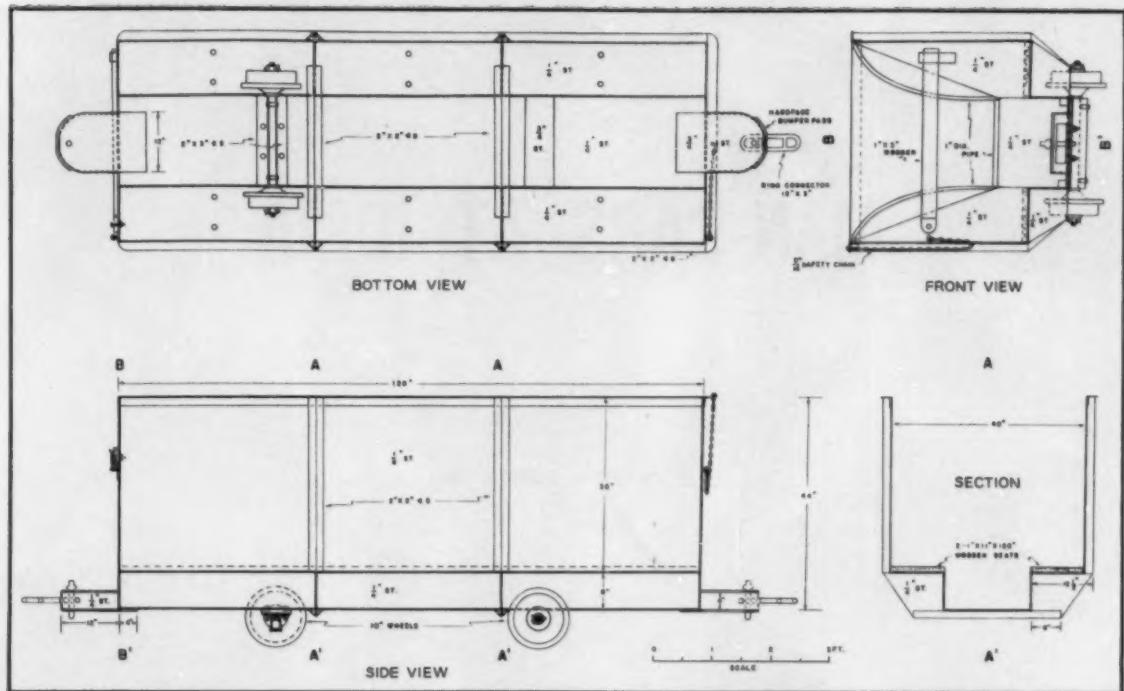
Prior to introduction of the new man-cars, ore cars had been used to transport the workers into the mine. These cars are of standard size with 24-in. track gauge and I beams supporting 12-in. diam wheels. Men sat on boards placed across the bottoms of these cars and reclined against the car side. In this position their heads were above the sides of the



A man-car now in use at the New Idria mine.



Miners at New Idria preparing to go underground.



Plan of new man-cars.

cars and, in some places within the mine, the men were forced to duck their heads to avoid hitting the low ceilings.

DESIGN FEATURES

The new cars were specifically designed to increase the comfort and safety of personnel. They are constructed of $\frac{1}{8}$ -in. steel plates on the rear and sides which are reinforced by $2 \times 2 \frac{1}{8}$ -in. angle irons. Steel plates of $\frac{1}{4}$ -in. thickness form the bottom of the car. The plates are welded together in an

integrated framework-box design that eliminates the need of I beams or any other type of frame. Thus the cars have greater depth and, as a corollary, higher sides. Miners are now adequately protected by the steel siding, which extends several inches above their heads. In addition, track-clearance has been further reduced by use of 10-in. diam wheels rather than the 12-in. diam wheels of the ore cars. This lowers the cars another 1 in. and places the car floor only $6\frac{1}{4}$ in. above the rails. By lowering the center of gravity of these cars, very little sway is incurred when the men are in transit.

Both axles have been placed between two $2 \times 3 \frac{1}{8}$ -in. angle iron strips 18 in. long. The angle irons permit the axles to move up or down $1\frac{1}{8}$ in. to prevent twisting of the cars caused by irregularities in the track. Steel straps, $1 \times \frac{1}{8}$ in., are used to retain the axles between the angle irons.

Within the cars, two $1 \times 1 \times 144$ -in. wooden seats are bolted to the $\frac{1}{4}$ in. steel plates that form the bottom of the cars. These seats are $15\frac{1}{4}$ in. above the railroad tracks. The steel plate which encloses the rear of the car protects the seated occupants from drafts due to the forced ventilation in the main haulageways.

SUMMARY

To date, the cars have proved more than satisfactory. After the initial stage of experimentation, the cars have not been altered. Although no springs or suspension system is incorporated in the cars, the riding characteristics are quite smooth.

It is hoped that the success and low cost of this type of "do-it-yourself" mine man-car now in use at New Idria mine will be of possible interest to other mine owners with similar problems.



Front end view of a man-car.

WATER



A CONTROLLING FACTOR OF COPPER PRODUCTION

by S. D. MICHAELSON, B. H. ENSIGN, S. J. HUBBARD, and A. W. LAST

Scarcity of water in arid regions makes it mandatory to determine the best, most economical use of this natural resource in desert climates. The copper industry in the West and Southwest has adapted itself to its environment, but further growth of the industry is necessarily related to the availability of adequate supplies of water.

Of the seventeen western states, five—Arizona, Utah, New Mexico, Montana, and Nevada—produce about 90 pct of this country's primary copper. All seventeen of these states occupy 60 pct of the nation's land area but receive only 25 pct of the country's total precipitation. Seventy percent of this precipitation returns directly to the atmosphere through evaporation and transpiration, leaving very little for ground reservoir recharge or immediate domestic, agricultural, or industrial use. With so limited a supply available for all, competition for water rights among users is severe. The result does not always permit using the limited supply to produce the most valuable end product.

Most of industry and much of agriculture can shop around for suitable operating locations. Where water is critical to their purposes, they can and do locate in areas where the needed amounts are available. Such is not the ordinary lot of the mining industry, which must locate in the area of the deposit it is planning to mine and concentrate. In the case of copper this happens to be, for the most part, right in the heart of the semi-arid regions of the West.

The importance of water to the copper industry is illustrated by Table I, which shows the average annual rainfall in the major copper-producing districts of the U.S. and their corresponding 1958 output of

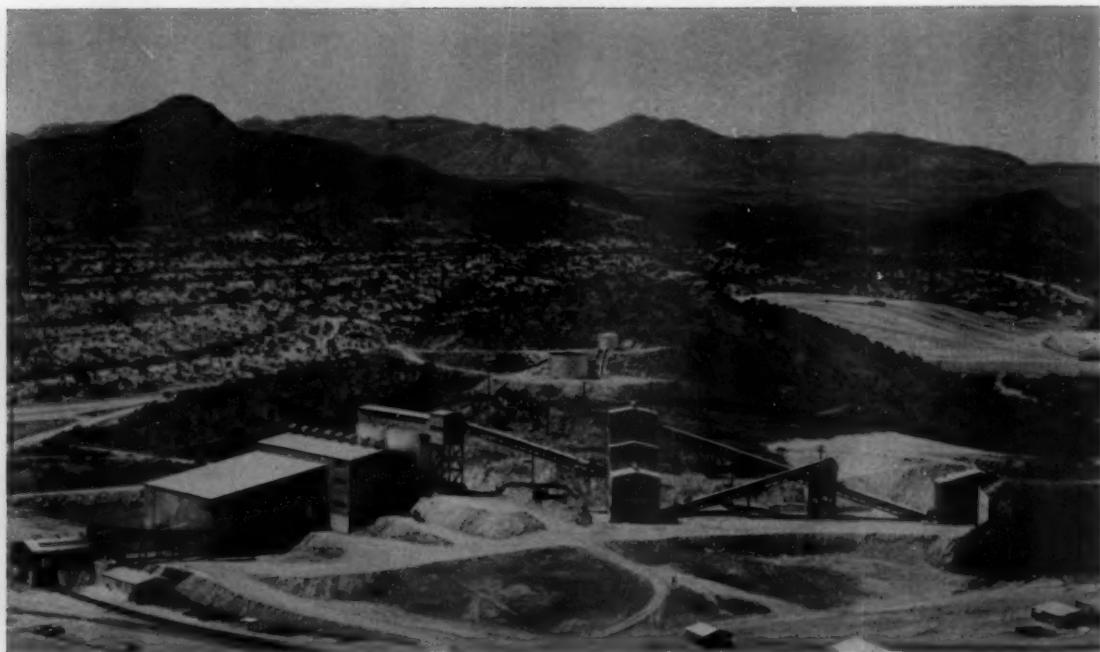
Table I. Rainfall and Major U.S. Copper Production

District	1958 Copper, Tons	Total U. S. Production, Pct	Rainfall in District, Avg. in.
Upper Michigan	61,145	6.17	32
Anaconda	85,318	8.62	15
Bingham	186,631	18.85	14
Ruth	36,343	3.87	15
Yerington	26,638	2.69	10
Hurley	55,383	5.59	10
Ajo	55,781	5.63	7
Bagdad	12,350	1.25	12
Blissie	64,707	6.53	15
Miami-Globe-Ray	138,780	14.01	20
Morenci	100,716	10.17	15
Pima	17,993	1.82	18
San Manuel	74,701	7.54	20

copper. It is worth noting that the entire U.S. receives rainfall averaging 29 in. per year, as compared with the figures given in Table II for the lush agricultural areas and the near-arid areas of copper mining activity.

Value of Water to Competing Water-Using Industries: The relative worth of the limited water used in nonmanufacturing industries in the Southwest can be determined by comparing the values of their various products obtained from the area. Statistics for Arizona are particularly significant, since this state alone produces 49 pct of the country's copper. Arizona receives an average of only 16.4 in. of rainfall annually over the copper-producing areas. In these same areas also are located important agricultural and cattle-growing industries which com-

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The arid climate at the Pima plant testifies to the importance of water conservation in Arizona's copper belt.

pete directly with mining for available water. Table III shows annual values of the various products of these Arizona industries. The dollar yields of each product per 1000 gal of water consumed are particularly interesting. The agricultural and cattle-raising figures were calculated on the basis of U. S. Department of Agriculture data reported for 1958.

Of the eight agricultural crops showing the greatest dollar yield in 1958, lettuce—which has a value of \$4.52 per 1000 gal of new water used—is the only crop that approaches the copper industry's dollar yield of \$7.80 per 1000 gal of water consumed.

Note that the net economic productivity of the water used for raising livestock in Arizona is only 30¢ per 1000 gal, or about 1/25th of the value of the copper produced with the same volume of water. But this is not the whole story. The hay produced in the state accounts for only one-fourth of the cattle feed required. If an accounting were made for the water used in growing the remaining three-fourths

of the feed, it would reduce the equivalent water value of the cattle to a negligible amount.

These data show that the copper mining industry uses water more efficiently, in terms of the value of its product, than any major agricultural or livestock industry in Arizona.

The long-range welfare of the nation can be served best by channeling its raw materials into products that have the greatest value to modern society. The present methods of allocating limited water supplies among competing users sometimes tend to subvert this principle and, instead, often rely on outmoded precedents and laws and on political expediencies. As a result, water is sometimes used in critical water-short areas to produce relatively low-value products that could be produced just as readily in areas having abundant water supplies, rather than to produce high-value products of industries that cannot locate elsewhere.

Use of Water in Producing Copper: The copper industry, like most industrial enterprises, uses considerable water. About 40 gal of process water are required to produce 1 lb of blister copper. For the 1776 million lb of blister copper produced in 1958 in the five western states being considered, this amounted to approximately 71 billion gal. Table IV shows where this water is used.

The actual mining itself accounts for only 1 pct of the total water consumption, and there is usually little or no problem in obtaining the small amount of water needed to mine copper ore. The major problem occurs in the milling phase, where 91 pct of the total process water is consumed.

In the past, in many cases, mills have been forced to locate at some distance from the mines (usually 15 to 25 miles away), and this location has been governed, in large part, by the availability of water. At the time these plants were located, pipeline transmission was relatively uncertain, but today's technology would permit a different approach.

Table II. Area Rainfall and Water-Consuming Activities

Area	Average Annual Rainfall, In.	Principal Water-Consuming Activities
U. S.	29	Agriculture, manufacturing and mining
Pacific Northwest	30	Agriculture
Southeast	51	Agriculture
Upper Michigan	32	Mining
Intermountain	14	Agriculture and mining
Anaconda	15	Agriculture and mining
Bingham	14	Mining
Ruth	15	Mining
Yerington	10	Agriculture and mining
Southwest	14	Agriculture and mining
Hurley	10	Agriculture and mining
Ajo	7	Agriculture and mining
Bagdad	12	Mining
Bisbee	15	Agriculture and mining
Miami-Globe-Ray	20	Agriculture and mining
Morenci	15	Agriculture and mining
Pima	18	Agriculture and mining
San Manuel	20	Agriculture and mining



The old Castle Dome, a typical scene of Southwest's copper operations—scrub oak, sagebrush, and settling tanks.

Other factors being equal, a new operation would consider pumping water to a mill adjacent to the mine rather than relying on an ore haulage system to a more remote mill.

In all cases, however, the cost of water delivered to the plant remains a major cost item for the entire operation, and availability of water can limit exploitation of a copper property, reduce the economic potential of processing low-grade ore because of restrictions on tonnage rate and, in some instances, make exploitation impossible.

WATER RECLAMATION IN COPPER PRODUCTION

The scarcity and high cost of new process water at the major plants in the Southwest has stimulated development of various schemes for reclaiming and re-using process water.

The simplest scheme uses decantation towers on the tailings ponds to reclaim clear water effluent from the settled tailings. Large-diameter mechanical thickeners, sometimes used with cyclone separators, are common at the larger plants for reclaiming the water from tailings before they are pumped or sluiced to the tailings disposal areas. Water

losses by evaporation from these systems and from storage reservoirs are minimized by using a blanketing film of cetyl alcohol on the surface of the ponds.

Unfortunately, there may be a limit to the use of reclaimed water if contaminants are introduced or chemical changes occur during the first use of the water in the process. Where this occurs the amount of reclaimed water which can be fed back into the system is governed by the effect on metallurgical recovery and grade of product. Extremes of hardness or pH may make the water undesirable for metallurgical re-use and too expensive to retreat for re-use. Conversely, the changed characteristics of the water may make it more desirable for agricultural purposes.

Even though the use of reclaimed water in copper mining operations introduces many economic and technical difficulties, reclamation must be practiced in all areas of restricted water supply. Review of the problem at 13 major copper mining operations in the Southwest showed that all were practicing some degree of water reclaiming. Complete detailed data for all properties were not available; however, of the companies studied for which operating details were available, six exercised maximum practical water reclamation. All of the remaining companies prac-

Table III. Values of Arizona Production in Terms of Water Used

Water Needed, In.	Acres in Use	Product Unit Value, \$	Product Total Value, \$	Value per 1000 Gal of Water \$
Winter wheat	21	130,000 1.75 per bushel	6,800,000	0.09
Barley	21	203,000 1.07 per bushel	10,100,000	0.09
Sorghum grain	21	83,000 1.25 per bushel	6,000,000	0.11
All hay	52	262,000 25.00 per ton	23,400,000	0.06
Potatoes	16	9,600 2.64 per cwt	4,700,000	1.13
Cotton	32	377,000 0.38 per lb	150,000,000	0.46
Cantaloup	22	12,000 5.83 per cwt	8,400,000	1.17
All lettuce	6	64,000 5.00 per cwt	47,200,000	4.52
Livestock with forage	—	950,000 head \$3.37 per head	88,700,000	0.30
Blister copper	77,870 gal per ton	— 0.30 per lb	293,400,000	7.80



View of the plant and the settling tanks at Kennecott's Arthur Mill located in Garfield, Utah. Thickeners here and at other mill sites in the West and Southwest play an important role in the reclaiming and recycling of process water.

ticed partial water reclamation. This does not necessarily mean that this latter group reclaimed only the water that came easily, but rather that the use of reclaimed water must often be restricted for any of the several reasons already mentioned. The ratios of reclaimed to new water used at those properties for which information is available range from a low of 1:1 to a high of 4:1.

Little if any water can be reclaimed from actual mining operations. In the milling stage, however, virtually all process water is theoretically reclaimable—though at prohibitive cost—by using a combination of thickeners, filters, and dryers, sending

would be recycled, probably through the grinding or classification circuit.

2) Install large-diameter thickeners, or a combination of thickeners and cyclones, to densify all tailings rapidly to minimize evaporation losses at the tailings disposal areas. The effluent from this circuit would probably go to the mill tanks for re-use.

3) Select tailings disposal areas on impervious ground to avoid loss of tailings water through the underlying strata.

4) Provide a decantation and water collection system on the tailings ponds to collect all water from the settled tailings. This water would be combined with the effluent from the thickeners and cyclones described in item 2 above.

5) Use cetyl alcohol, or a similar compound, on all process water ponds and reservoirs to minimize evaporation losses.

With a water recovery system of this type, up to 67 pct of the total process water used in the milling circuit could be reclaimed at reasonable cost. With milling requiring about 91 pct of the water used in the entire copper production operation, and with maximum water economy practiced at mine and smelter, this water recovery system would reclaim about 60 pct of the total water required. As a rule-of-thumb it could be said that one ton of new water is required for each ton of copper ore milled, when maximum water economy and maximum practical water reclamation are practiced. This applies only when the quality of the water is unaffected by the ore or the recycling flowsheet.

The maximum quantity of water that can be reclaimed from any circuit will vary from time to time as the settling characteristics of the pulp change, and as the wind, temperature, and humidity vary. For example, at one large copper property the

Table IV. Water Required to Produce Copper from a 15,000-Tpd Mine

Product	Mine	Mill	Smelter
	Ore	Concentrate	Bilster copper
Copper in product, pct	0.98	16.85	99.63
Copper recovered from ore, pct	100	86.3	83.7
Tons to produce 1 ton bilster copper	122.0	6.1	1.0
Water, gal, for 1 ton bilster copper	830	70,760	6,280
Total water used, pct	1.07	90.86	8.07

dried tailings to waste, and recycling effluents and condensate. In practice it is extremely difficult and costly to reclaim much more than half the total process water needed at the average property. For such a plant to achieve maximum water recovery, it would be necessary to:

1) Install thickeners in the flotation middling return circuit in the mill to minimize pulp dilution in the middlings retreatment. This thickener effluent

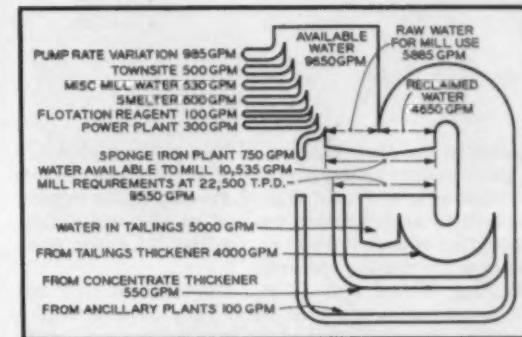
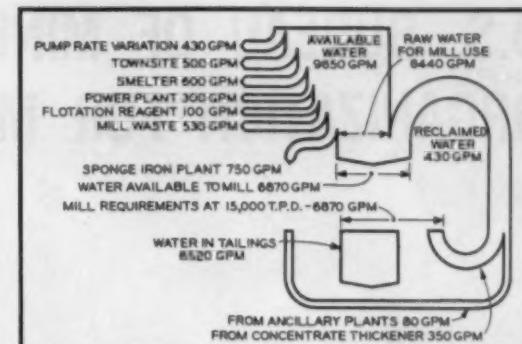
CASE HISTORY OF WATER RECLAMATION IN COPPER PRODUCTION

Some of the water problems encountered in copper mining in the Southwest can be illustrated by a recent case where increased ore reserves made it desirable to schedule a 50 pct increase in production capacity. Existing water rights, amounting to 9650 gpm, were barely enough to maintain production at the unexpanded rate of 15,000 tons of ore per day, even with a limited water reclamation system in use. The company owned some additional agricultural water rights not readily transferable to industrial use. Accordingly the proposed expansion was governed to some extent by the amount of process water which could be reclaimed and re-used. A relatively expensive water reclamation system was engineered to recover—at a cost—nearly half the total initial water brought into the system. The problem was complicated because the dual-process milling flowsheet in use prevented satisfactory metallurgical results from being obtained with water from one of the two milling procedures.

The water balance for this plant at the 15,000-ton daily milling capacity is shown in the upper diagram (right). The water balance for this operation when expanded to a 22,500-ton daily capacity is shown in the lower diagram. Study of the data indicates that a practical limit has been reached in milling capacity with the available water supply.

water recoverable from the tailings pond varies from 22,000 gpm in winter to 18,000 gpm in summer because of differences in evaporation rate alone.

Table V shows the economic effect of water reclamation in producing copper concentrates at four mills. Mill A, which practices partial water reclamation intermittently, produces concentrates valued at only \$7.50 per 1000 gal of new water consumed. Mill B practices limited water reclamation and produces a lower grade of concentrate, but even this has a value of \$8.76 per 1000 gal of new water used. Mills C and D practice maximum practical water reclamation, and even though this results in a high cost for total water used, the production is worth \$15.17 and \$10.10, respectively, for each 1000 gal of new water used. Some additional credit should accrue from any increased production permitted by



the use of reclaimed water if additional new water is not available.

SUMMARY

The copper mining industry needs about 77,870 gal of process water to produce one ton of blister copper from the low-grade porphyry ore deposits in southwestern U.S. The need for new water can be cut to about 31,150 gal per ton by practicing maximum practical reclamation in those cases where process water contaminants do not exist. Because of the scarcity of water in this semi-arid region, which produces 90 pct of the country's primary copper, all major plants practice some degree of water reclamation.

If the value of copper produced per 1000 gal of water consumed is compared with the product values per 1000 gal of water consumed by the agricultural and cattle-raising industries, it is apparent that the copper industry is the most economically efficient major nonmanufacturing user of water in the Southwest.

The technical efficiency of re-using process water in the copper industry appears to have reached its practical limit, at least for the time being. Because of this, and because of the limited overall supply of water and the need to mine increasingly greater tonnages of lower grade ore to maintain production, the industry's water supply problem can be expected to become more and more severe.

Under such conditions, consideration should be given to apportioning water so that the maximum value of product can be obtained from the locally available supply. This would permit the copper industry to expand its low-grade, high-tonnage operations to maintain the necessary metal production of the nation.

Table V. Water Used and Value Produced at Typical Western U. S. Copper Mines

	MILL A No Water Reclama-	MILL B Limited Reclama-	MILL C Water Reclama-	MILL D Water Reclama-
Ore milled per day, tons	88,000	15,000	22,000	21,000
Copper in concentrate, pct	30	16	25	22
Mill consumption, total water per ton, gal	795	618	636	781
Mill consumption, new water per ton, gal	795	580	310	410
Total metal value, \$, per ton of concentrate with copper at 30¢ per lb	240.13	97.32	157.76	141.33
Tons of ore to produce 1 ton of concentrate	40.2	19.1	33.5	34.1
Total water to produce 1 ton of concentrate, gal	32,000	11,800	22,000	26,000
New water to produce 1 ton of concentrate, gal	32,000	11,100	10,400	14,000
Total value per 1000 gal total water, \$	7.50	8.24	7.17	5.31
Total value per 1000 gal new water, \$	7.50	8.76	15.17	10.10

U.S. BUREAU OF MINES COMPLETES ORGANIZATION FOR MINING RESEARCH

by PAUL T. ALLSMAN

Recently the U.S. Bureau of Mines completed organizational changes that, for the first time since the beginning of World War II, re-emphasize mining research as an important part of its responsibilities. A progress report follows on the Bureau's improved program for mining research.

During World War II the Bureau's mining research lapsed in favor of short-range, more urgent activities. Since the end of the war mining has gradually returned to an economy where reduced costs and increased efficiency are essential to a vigorous industry, and demand for improvement through expanded research is again pre-eminent. In recognizing this situation, the Bureau is again emphasizing mining technology and has reinstated some of its earlier mining research activities. Recent research, however, follows a more scientific approach in solving mining problems because new technology, particularly new instrumentation, has developed rapidly during the past decade.

At present, most of the emphasis is on basic research. Mechanics of rock failure encountered in mining are being studied intensively to determine better methods of predicting and controlling ground movement. Research to determine the basic principles involved in drilling and fragmentation is proposed with the aim of developing new and cheaper processes for breaking rock. Engineering studies are being conducted in coal mines on alternate methods of roof support and alternate methods of breaking and transporting coal to heighten efficiency and reduce costs. New equipment suitable for mining anthracite and phosphate rock is being developed to increase recovery and safety and lower costs.

NEW RESEARCH FACILITIES

The following mining research units have been established to accomplish the goals more effectively: Health and Safety Research and Testing Center, Pittsburgh, Pa.; Coal Mining Research Center, Pittsburgh, Pa.; Applied Physics Research Laboratory, College Park, Md.; Mining Research Center, Minneapolis, Minn.; Mining Research Center, Denver, Colo.; Office of Mining Research, Rolla, Mo.; Office of Mining Research, Spokane, Wash.; Office of Mining Research, Reno, Nev.

P. T. ALLSMAN is Chief Mining Engineer, U.S. Bureau of Mines, Washington, D. C.

Health and Safety Research and Testing Center: The Health and Safety Research and Testing Center in Pittsburgh was created by bringing together the research and technical groups of the Health and Safety Activity and separating them from routine duties. The Center is principally concerned with research on dust explosions, mine roof control, ventilation, health, electrical and mechanical testing for permissibility, and control of mine fires.

Pittsburgh Coal Mining Research Center: Organizing and staffing of this Center is still in progress. Research is being done or is planned on hydraulic coal mining, degasification of coal seams, and engineering analysis of coal mining practices. Although it is not possible at this time to be specific about the full research program at this Center, the Bureau feels certain that a program will evolve from the type of research now being done. The present program will be expanded to include studies of physical and mechanical properties of coal and associated rock formations. Efficiency of the hydraulic method of fragmentation as compared with other mechanical or conventional methods undoubtedly will bring about research on fragmentation generally.

Applied Physics Research Laboratory: The role of the Applied Physics Research Laboratory in College Park, Md., has been in the process of evolution for nearly 20 years. The Laboratory started with the realization that the principles of physics and, more specifically, mechanics are involved in nearly every stage of mining from the exploration and development phases through extraction and the many ancillary operations.

In developing a comprehensive mining research program it has become apparent to the USBM that applied research can progress faster and go further by including a greater amount of basic research on the fundamental physical principles involved in mining. In view of this, there has been a revised concept of the Laboratory's responsibilities, which have been broadened to include cognizance of the application of physics to all areas of mining in the USBM regardless of commodity area or function.

Minneapolis Mining Research Center: The Center in Minneapolis has been assigned the problem of conducting research in the broad fields of rock penetration and fragmentation. The USBM plans that penetration studies will include but will not be limited to drilling and boring; fragmentation re-



Location of the new U.S. Bureau of Mines research centers—1) Office of Mining Research, Spokane, Wash.; 2) Office of Mining Research, Reno, Nev.; 3) Mining Research Center, Denver, Colo.; 4) Mining Research Center, Minneapolis, Minn.; 5) Office of Mining Research, Rolla, Mo.; 6) Health and Safety Research and Testing Center, Coal Mining Research Center, Pittsburgh, Pa.; 7) Applied Physics Research Laboratory, College Park, Md.

search will include but will not be limited to explosives breakage. Besides the more conventional methods employed in breaking rock, other methods and principles to be studied include application of shock by dielectric and induction heating, other means of heating, and cavitation. Fundamental research on the intercrystalline and intergranular structure of rock also will be studied to discover better ways of breaking rock. In addition, workability standards will be developed for drilling and other fragmentation methods.

Denver Mining Research Center: The Denver Center will conduct mining research on ground control (techniques and rock mechanics applied to mining) as well as on sampling procedures.

Research on ground control now emphasizes better understanding of caving methods, particularly block caving. This research can be broadly divided into study of the factors related to design and study of the behavior of broken rock in extraction.

The sampling research primarily concerns optimum procedures for sampling mineral deposits, stockpiles, placers, and many nonhomogeneous physical characteristics. Statistical mathematics has been found to be a most useful tool in this type of research. A natural outgrowth of developing competence in statistical mathematics will be the emergence of a research program concerning the analysis of mining operations.

Rolla Office of Mining Research: The Rolla office has been assigned the broad field of water control

in mining. In addition, because of early interest at the laboratory, a research program is being conducted on abatement of noise in drilling and underground equipment.

Spokane Office of Mining Research: The Spokane office is authorized to conduct mining research on artificial ground support, a subdivision of ground control. This includes mechanical support—timber, concrete, metal, compacted materials, cementing, and chemical stabilization—and possibly others.

Reno Office of Mining Research: The Reno office is primarily concerned with slope stability in open pit mines, but special research on drilling and ground subsidence also has been assigned.

SUMMARY

When specialized research has been assigned, a center is given the responsibility for engineering studies plus analysis and development of engineering principles on mining technology related to its primary research responsibility. In moving toward the development of areas of specialization, the USBM expects that a degree of competence in general mining engineering will be preserved at each location. Each establishment has been authorized to engage in applied problems in its local region to the extent of this competence. However, the redefinition of responsibilities anticipates that on basic research problems, programs will be assigned on a functional rather than a geographic basis.

SILVER IN A TIME OF CHANGE

by EDWARD SAMPSON

Despite the many industrial uses, the world market for silver as a commodity is far from free, being dominated by the U.S. Government both through acts of Congress and by policy of the Treasury Department. This discussion will consider aspects of supply, demand, and price with a view to the future.

Changes in Sources of Supply: The world's peak production of silver, 278 million oz, was in 1937. In the 1850's world production was about 30 million oz, having risen from a yearly average of 11 million oz for the first half of the century. From 1860 to 1940 there was a steady rise, broken only by World War I and the depression of the early 1930's.

In considering this rise, and also in looking to the future, it should be borne in mind that silver comes from two kinds of ore; one in which it yields a major part of the profit of mining, and the other in which it is a minor constituent and essentially a byproduct. Most silver now comes from ores of the latter kind which are mined chiefly for lead or copper. Output from these sources, estimated to be about 70 pct of the total, is little affected by variations in the price of silver. Primary silver production is therefore a minor factor and is becoming even more so as the years go by.

For the past 70 years most of the world's production, and the remarkable increase in total output, came from the great bonanza deposits. These were of extraordinarily high grade and capable of yielding a large amount of silver in a short time. Their effect on world markets was profound, but it is the nature of such deposits to be impersistent in depth. All the great districts based on such deposits are now

worked out or past their peak production. It is of historical interest to see the effects of the discovery and development of these great camps, and it is important to bear in mind that in looking to the future we must seek new sources.

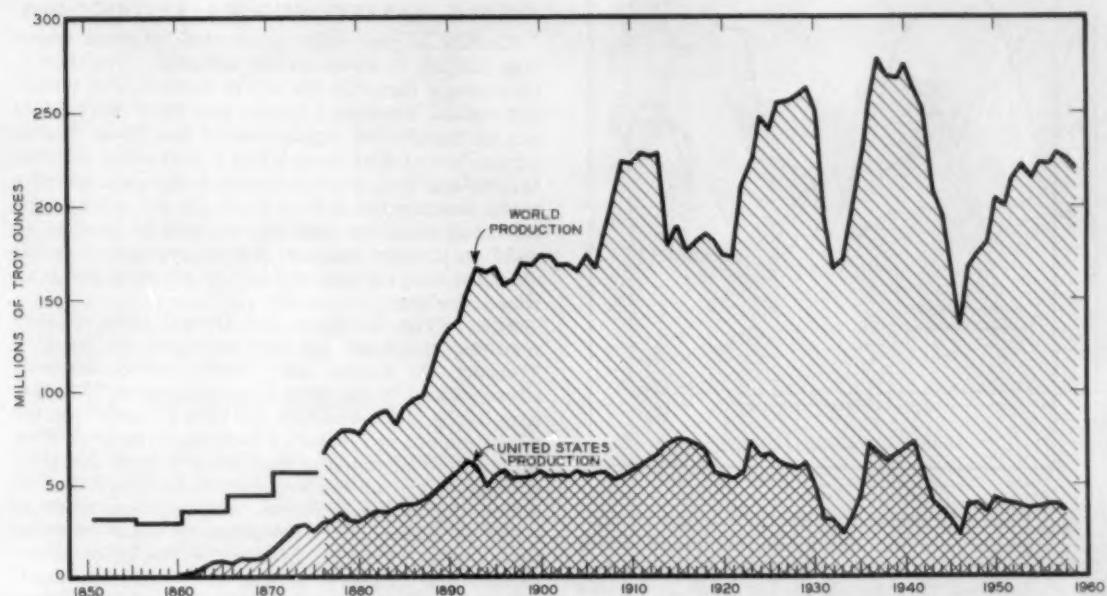
The first of these great discoveries was the Comstock Lode of Nevada in 1859. Because of the extraordinary richness of its ore, the Comstock was developed quickly and reached peak production in the late 1870's. The camp produced about \$350 million in silver and gold, silver having a slightly greater value. Rich as the camp was, its potentialities were hysterically overvalued.¹ Rickard records subsequent events as follows:

In 1871 Germany adopted the gold standard and ceased the minting of silver. In 1873 the United States, by Act of Congress, discontinued the coinage of silver dollars; in the same year Germany provided for the retirement of its silver coins and the sale of the bullion; in 1874 the governments of the Scandinavian countries demonetized silver; in 1875 Holland suspended the minting of silver for private account and established a gold coinage; in 1876 France and Spain did likewise.

The decline in the price of silver was only moderate and probably the substantial sale of demonetized silver was a considerable factor.

In 1878 rich silver ores from the recently discovered camp of Leadville, Colo., and the greatly increased silver production from Bolivia brought up the total output. In its early days Butte, Mont., was primarily a silver producer and in the late 1880's

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Silver production—World and U.S. For the period 1850-1875, world production reported as 5-yr averages.

silver production from this camp and from the recently discovered district of Broken Hill, Australia, produced marked effect. About 1907, production from the newly found district of Cobalt, Ont., augmenting increased production from Peru, swelled the total world output. World production rose to 228 million oz in 1913 until checked by World War I.

A new peak of 261 million oz was reached in 1929 owing to greatly increased production from Mexico. The all-time peak of 278 million oz was attained in 1937, but much of the silver included in the total was from ores in which silver was not the metal of major value. Production has since declined to the present annual rate of about 220 million oz. The days of the great camps which produced ore mainly for silver have passed. The odds today are very long against discovery of new camps such as Comstock, Pachuca, or Cobalt. Future increase in output of silver will be less affected by a moderate increase in price of silver than it will by a corresponding increase in price of the associated base metals—lead and copper.

At present five countries produce 74 pct of the world's silver and four more bring the total up to 88 pct. The 1958 figures, which are the latest available, are given below. Ten additional countries produced more than 1 million oz each:

	Million Ounces	Percent of Total
Mexico	47.6	21.4
U.S.A.	35.7	15.8
Canada	31.9	14.2
U.S.S.R.	25.0	11.1
Peru	24.2	10.7
Australia	15.4	6.8
Japan	8.3	3.7
Bolivia	7.4	3.3
East Germany	4.5	2.0

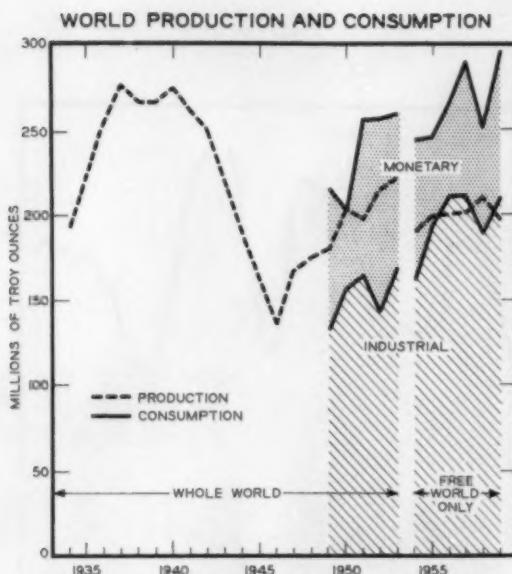
SILVER USAGE

Monetary Use: In many countries monetary silver is in circulation as coins of small denomination, but in the U. S. a large reserve of bullion is also held as security for silver certificates. At the present time the U. S. has in this reserve and in circulation as coinage nearly one quarter of all the silver ever produced (except that which has been dissipated), and this represents about three quarters of the monetary stocks of the world. On Dec. 31, 1959, the U. S. Treasury silver was distributed as follows:

	Million Ounces
Held in Treasury	
Securing silver certificates	1741
Silver bullion	141
Silver dollars	2
Subsidiary coin	173
Free silver bullion	
Total Treasury stocks	2059
Outside the Treasury	
Silver dollars	236
Subsidiary coin	1085
Total silver outside the Treasury	1331
Total silver	3391

No other countries hold supplies of silver, either as coinage or bullion, that are at all comparable to those of the U. S.

To a considerable degree a government's financial soundness can be measured by the amount of silver in circulation as coins. When times are hard, silver coinage may be replaced by paper and the metal melted down and sold. However, public reaction is strong against small fractional paper currency. Western Germany, Austria, and Italy have all gone



Source: Handy & Harman. Note—due to lack of adequate statistics from the Soviet bloc, the period 1954-1959 represents Free World only. Monetary and industrial consumption data for the period 1949 to present are not comparable with statistics of prior years.

back to silver coinage, either to replace base metal or in substitution for paper. France is minting silver coins at a rate estimated to require 13 million oz annually for the next five years. Growing use of vending machines has substantially increased the need for silver coins in the U.S. From 1949 to 1959 the U.S. silver coins in circulation increased 58 pct—from 843 to 1331 million oz. In the non-Soviet World the coinage use represented 31 pct of the world's production of new silver.

Industrial Use: In the past 25 years a very remarkable development has occurred in silver usage. In the mid-1930's most of the industrial use was for silverware and the arts. The special properties of the metal have greatly widened its use. Of all metals, silver is the best conductor of electricity and heat. Also it imparts desirable properties to solders, making them usable with nearly all metals and also capable of withstanding higher temperatures than common solder. In the U.S. about three-quarters of the industrial silver now consumed is for photographic products, solder, and electrical contacts. In addition there is a growing number of industrial uses as well as the age-old use for silverware.

As a result of new industrial demands for silver, world consumption has increased from about 20 million oz in 1934 to more than 200 million oz at the present time. For the 1955-1959 period consumption of silver by industry alone has slightly exceeded world production of new silver, average figures for the Free World consumption being respectively 202 and 203 million oz a year.

With large monetary demands added to industrial requirements, the outlook for the future is truly disturbing. In the non-Soviet world from 1955 through 1959 total use of silver has averaged 69 million oz a year more than production. The supply

that has maintained equilibrium in the silver markets of the world is the Free Silver bullion of the U.S. Treasury.

WORLD MARKETS AND U.S. RESTRICTIONS

London is the only substantial market where free trading in silver exists, although Frankfurt is becoming a factor in the world market. The freight differential between London and New York is 1¢ per oz. Restrictive regulations of the Silver Transactions Act of 1934 have killed U.S. trading in silver futures—as they were intended to do—and ended a really free market in New York. By this act half the profits of all silver transactions become taxable. In addition, the act imposes severe accounting duties on those who are engaged in the smelting and purchase of silver.

The Silver Purchase (or Green) Act of 1946 regulates purchase and sale of silver by the U.S. Treasury. It directs that newly mined domestic silver offered to the Mint be purchased at 90.5¢ per troy ounce and authorizes the sale of silver (at the discretion of the Treasury) from the Treasury's Free Silver stock at not less than 90.5¢ per oz. Actually the act refers to the acquisition of silver and in theory the bullion is minted and payment made in silver as dollars, after deduction of a toll of three tenths as seigniorage. In practice the price is for receipt and delivery at the San Francisco mint. Silver can be shipped from San Francisco to New York by truck for about 0.5¢ per oz.

The silver acquired by the Treasury and used to back all silver certificates is valued on its books at \$1.29. This price was established by act of Congress in 1834 and represents a 16:1 ratio of gold to silver with gold at the pre-1934 price of \$20.67 per oz. This succeeded a 15:1 ratio established by Alexander Hamilton and an act of Congress in 1792. The silver of subsidiary coinage is valued at \$1.38. The price of 90.5¢ is 70 pct of the \$1.29 figure established in 1834. This results in 7 oz out of 10 being assigned to back silver certificates and 3 oz going to the Free Silver stock. Much criticism has been directed at the legislation which requires the purchase of silver at a price above that of the open market as a "subsidy" to the domestic mining industry. From time to time in recent years the open market price has been above the Treasury price and continuously so since March of 1959. The Treasury obtains a 30 pct seigniorage on its silver certificates and a 53 pct seigniorage on the subsidiary coins: halves, quarters, and dimes.

In recent years the Free Silver stock of the U.S. Treasury has become of increasing importance. The great amount of currency and hoarded silver of China and India are gone. Other countries that had substantial amounts of silver currency have withdrawn it and sold most of their silver. For example France, having disposed of most of its silver coinage, with a concurrent great inflation of its currency, is now a buyer of silver. The U.S. Treasury, with about 2100 million oz of silver in reserve in addition to more than 1300 oz in circulation, is the great repository of the world's silver. Of this only the Free Silver stock is readily available to the U.S. market, so that as long as the U.S. Treasury sells at the price of 91¢, it largely controls the world price.

In looking to the future it is important to gage the adequacy of this Free Silver supply. On June 30, 1945, there were 696 million oz in the stock.

From 1943 to through 1946, 411 million oz were released as Lend-Lease to the following:

Lend-Lease Shipments	Million Ounces
India and Pakistan	226.0
United Kingdom	88.1
Netherlands	56.7
Saudi Arabia	22.3
Australia	11.8
Ethiopia	5.4
Belgium	0.3
Fiji	0.2
Total	410.8

Of the original Lend-Lease silver, 1 million oz were lost in shipment, 375 million oz have been repaid, and 35 million oz were outstanding at the end of 1959. From 1954 through 1959 the Free Silver stock shows an increase from 14 to only 175 million oz in spite of the 375 million oz from Lend-Lease repayments. This indicates a deficit of 200 million oz without the returned Lend-Lease silver.

U.S. TREASURY REQUIREMENTS

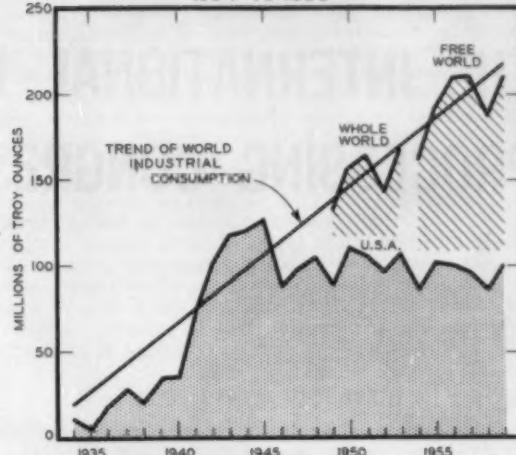
Production of new silver in the U.S., which averaged 38 million oz for the ten-year period 1949-1958 (and in 1959, owing to strikes, was only about 24 million oz), is much less than the Treasury requirements and only comes to the Treasury when the Treasury price is above the world price. The Treasury price for recent months has been below the world price and the flow is out rather than into the Free Silver stock. Coinage consumption for the period 1950-1959 averaged 39 million oz a year, and in addition 21 million oz a year were "allocated to silver securing certificates," making an average total annual Treasury requirement of 60 million oz. Present Free Silver stocks appear only sufficient to meet Treasury requirements for not more than three years before exhaustion, and the supply might well be used up in less than two years. Sales to industrial consumers, substantial in recent months, and made at a price below the world price, simply hasten the day when the supply of Free Silver will be used up. To conserve this supply and to stop sales of Free Silver at a time when domestic production is far less than consumption would be a wise policy.

WORLD SITUATION

In recent years U.S. production of silver has been less than requirements for monetary use of the Treasury. With an industrial consumption averaging 100 million oz a year in addition to the Treasury use, it is clear that domestic production of new silver is far below national requirements.

When the world situation is examined the outlook is disturbing. Free World production for the six-year period 1954-1959 was, in millions of ounces, 200 against an industrial use of 196 and a coinage use of 71 for a total use of 267. This left an average annual deficit for the period of 67 million oz. The only great supply of silver in the world is the U.S. Treasury reserve of "Silver Bullion Securing Certificates," and on June 30, 1959, this stood at 1677 million oz. The writer will not go into the large question of the need for silver backing of U.S. paper currency, a subject on which there are strong differences of opinion, but will point out that this reserve has been entered on the books of the Treasury at \$1.29 per oz and that Congressional authorization would be required for any sale of this metal. It seems highly doubtful that any legislation will be enacted

INDUSTRIAL CONSUMPTION OF SILVER,
1934 TO 1959



Source: Handy & Harman.

that will permit sales at a loss. The problem also arises of conserving a substantial amount of silver as a strategic stockpile. There is no such stockpile other than Treasury monetized silver. Some of the wartime demands on Treasury silver are summed up by Simon D. Strauss:¹

When World War II broke out the Treasury held about 2500 million ounces of silver bullion. During the war it lent 411 million ounces to our allies under lend-lease; put 902 million ounces into defense plants as a substitute for copper (thereby saving 40,000 tons of copper); and sold 135 million ounces to industry to be used as directed by the War Production Board. At the end of 1945, the Treasury holdings were only 944 million ounces.

CONCLUSION

It seems clear that with world consumption continuing in excess of production it can not be long before something has to give. A world price higher than the Treasury purchase price of 90.5¢ per oz may be with us for some time. A pressing need for the U.S. silver consumer and producer alike is to get rid of the legislation controlling the purchase and sale of silver by the Treasury as well as the prohibitive Silver Transactions Act and thereby establish a free market in the U.S. If not, then when the Free Silver stock is exhausted, the stabilizing effect of Treasury sales will cease and an explosive price rise could occur because both the Treasury and other consumers will have to go to the open market for their silver. This demand would, of course, stimulate the exploration and possible development of silver deposits by that small group of mining companies that derive a substantial share of their income from silver, there would be a considerable time lag before the silver price would be stabilized again by a better balance between supply and demand. Thus the forecast at present is for a price increase of silver that may become acute.

REFERENCES

1. T. A. Rickard: *A History of American Mining*, 1932, pp. 110-111.
2. Statement filed, Jan. 19, 1956, with Sub-Committee of the Federal Reserve, by the Committee on Banking and Currency of the U. S. Senate.

SPECIAL REPORT ON

THE INTERNATIONAL MINERAL PROCESSING CONGRESS

by H. RUSH SPEDDEN

The third International Mineral Processing Congress was held in London in April 1960 under the auspices of the Institution of Mining and Metallurgy. The program, which included papers on both research and practice, was arranged by a committee under the direction of J. E. Denyer, Chairman, and J. H. Watson, IMM President (1959-60). Leaders in this field of technology from all parts of the world participated. The following review is presented in an effort to give the members of the Society of Mining Engineers the highlights of the technical program. The bound volume of the proceedings of the Congress will be available later this year through the Institution of Mining and Metallurgy, 44 Portland Place, London, W.1, England, at £5 (\$14) per copy.

COMMINUTION

R. T. Hukki¹ has extended his study of ball mill grinding at supercritical speeds with an excellent mathematical analysis of tumbling mill grinding. When he speaks of supercritical speeds he is referring to the original Fahrenwald critical-speed formula. He said that, as an example of the use of supercritical speeds, if a fine grinding mill of any type is wet-grinding ore of 3.5 sp gr with steel balls at a certain conventional subcritical speed, the same power input and capacity should be obtainable with autogenous medium of 3.5 sp gr at a speed 100 to 120 pct of the critical in a grate-type mill of the same effective size. In addition, he introduced what he calls the *base mill* concept which, he stated, makes it possible to compare performances of mills of different sizes grinding with a metallic medium or with an autogenous medium of any specific gravity and at any speed. He showed the use of this concept and explained how it makes possible the evaluation of mill sizes and motors for any grinding purpose at any accuracy well within the conventional standards of design in milling practice. He further stated that the maximum capacity in pilot plant mills with various media, either metallic or autogenous, has always been found to be within the supercritical speed range. In his discussion of this paper he substantiated these findings with statements showing the increased capacity

obtained in a milling plant in Finland which followed his principles.

D. Weston's paper² describes the factors which he considers are of importance in the Aerofall grinding system as being: 1) impact crushing combined with compression which is suddenly changed to tension, 2) abrasion grinding by spinning particles, 3) controlled circulation of particles of different masses, 4) controlled particle placement and segregation into zones, and 5) the four-stage classification system. These ideas were challenged, particular emphasis being placed on the concept of a crushing action being brought about in a mill which could produce strong compressive forces followed by a sudden change to tension. This theoretical battle will undoubtedly be continued. In support of the Aerofall system, A. M. Gaudin pointed out that this mill has been highly successful in producing grain boundary comminution, a long-sought mechanism in grinding. He added that the mill accomplishes the comminution with lower steel consumption. These facts were further emphasized by Bengt Fagerberg, reporting on independent tests made in Sweden by the mining company for which he works in cooperation with a research committee of the Swedish Mining Assn. As a result of a careful and detailed experimental program, Fagerberg and Herbert Ornstein³ found that the Aerofall mill gives considerably better liberation than rod mills and is at its best when grinding fairly hard ores from which high-grade concentrates are to be produced. Both wear and power costs can then be kept at a lower level with the autogenous mill than with rod mills. They also state that the selective grinding properties and quick discharge in Aerofall milling give closely

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sized products and high concentration recoveries on separation. Reference was made to test work on Swedish magnetite ores containing about 30 pct Fe. In the discussion, P. H. Falstrom stated that even though he has recognized the advantages of a grind such as produced in an Aerofall mill, he has chosen an autogenous mill of large diameter which can be used either wet or dry. This, he believes, offers greater versatility while gaining most or all the advantages of the type of grind produced in an Aerofall mill and at the same time making possible the use of a wet grinding circuit. D. G. Armstrong⁶ discussed in detail both methods and equipment for conducting grinding tests on a laboratory scale and showed how the results of this system may be extrapolated to commercial practice. P. Westerlund⁷ described a newly designed vertical mill in which grinding is performed by forced attrition. His mill was found to have a capacity six to eight times greater than a conventional horizontal mill of the same size, but the energy requirements per ton were found to be the same as in conventional grinding.

CLASSIFICATION AND THICKENING

Gaudin,⁸ in conjunction with M. C. Fuerstenau, has extended his study of thickening as reported in Vol. 214, Transactions AIME, by using the transviewer, which employs X-ray absorption to evaluate the solid content of suspensions. He suggests that the settling of thick flocculated pulps is a bimodal process equivalent to filtration through both tubes and tubules. Filtration through tubes takes place and is completed at an early stage, while that through tubules continues indefinitely within the experimental range.

Liquid cyclones continue to command considerable attention. D. Bradley,⁹ in his paper on the design and performances of cyclones thickeners, has worked out a series of functions and curves which he claims will assist in the design of cyclone thickeners. This work was based on the use of a cyclone of 1½-in. diam., with dilute slurries of spherical particles. He concludes that there is an optimum vortex finder length for each feed-size distribution and that for applications where excessive quantities of fine material are anticipated, a short vortex finder is required. His work is supplemental to previous reports by D. F. Kelsall, D. A. Dahlstrom, and others. On the other hand, C. G. Peachy¹⁰ investigated cyclones from 24 to 30-in. diam working at low pressures in the range of eight lb per sq. in. He studied these cyclones as classifiers in a tertiary milling circuit. He concludes that under fixed conditions a pulp of a definite viscosity always arrives at the apex of the cyclone and that this pulp contains a definite amount of the finer-sized particles. If the apex is not large enough to allow the passage of the coarser material in addition to the fines, the coarser fractions are forced into the overflow. He stated that the cyclone behaves in fact as if the order of the sizing of particles across the diameter is the reverse of what would be expected; instead of the larger particles being next to the shell and the smaller particles and water near the central axis, the top-priority pulp of -200 mesh and water is next to the shell, forcing the larger particles toward the central axis where a portion can be caught up and transferred to the overflow. Obviously, such conclusions generated considerable discussion among those who have been working with the details of cyclone operation. Peachy's detailed analysis, however, will probably be of value to those who are considering employing low-pressure large-diameter cyclones as classifiers.

D. F. Kelsall and J. A. Holmes¹¹ reported on the use of water injection for displacing entrained slimes from cyclone underflows. Their experiments were an attempt to extend some of the ideas, previously propounded by Dahlstrom, into a workable system for use in a closed grinding circuit. By using a cyclone with double

apexes located one above the other and with tangential water injection below the upper apex, they have produced some most interesting and, apparently, quite beneficial results. In their studies with a 24-in. cyclone in a closed-circuit grinding installation treating 22 tph of new feed, they found that they were able to drop the circulating load from 350 pct down to 160 pct, which was accomplished mostly by lowering the amount of -200 mesh recycled to the ball mill from about 8 tph down to slightly less than 2 tph. The efficiency of classification rose from 71 pct without water injection up to 86 pct with water injection. They have applied for patents on their design.

By a theoretical study of the movement of particles in fluids, G. Ferrara¹² concluded that mineral separations might be accomplished by allowing a pulp to flow through a rotating horizontal tube. He verified his concepts in part by experiments with pure mineral fractions of several densities.

FLOTATION RESEARCH

The session on the theoretical aspects of flotation was dominated by the Russians and, by and large, the titles of their papers are descriptive of the scope and direction of the work they are doing. Undoubtedly the mass of work being done in the USSR will further our knowledge of flotation, and we may presume that only time will tell whether an improved technology has justified the effort.

The paper by O. S. Bogdanov et al.¹³ on kinetics states that the rate of interaction of xanthate with galena, and of copper ions with sphalerite, are in linear relation to the concentration of such ions in solution, provided that the density of the sorption layer constitutes only a fraction of a monolayer. He has also found that, when potassium zinc cyanide is used as a depressant in the presence of secondary copper sulfides, the removal of copper ions is supplemented by the formation of zinc-ion films. This film, which slows down the dissolution of copper sulfides, accounts for the successful separation of galena from secondary copper sulfides and sphalerite.

V. A. Glembotsky¹⁴ has tried another idea for the application of ultrasonics to mineral processing. He has found that he can effectively strip a xanthate collector from galena and pyrite and that the collector, when stripped into solution, will no longer act as a collector for fresh mineral surfaces. He stated that experiments have shown that it is theoretically possible to selectively float chalcopyrite from galena after treating the bulk concentrate of the two with ultrasonic irradiation. The same is true for a separation of sphalerite from galena and chalcopyrite from pyrite. He did not, however, give figures for the power consumption nor did he consider the economics of the process. As another approach to the problem, he stated that recently a new method of selective flotation of bulk lead-zinc concentrates has been introduced successfully in the USSR. The method is based on the use of sodium sulfide to desorb the collectors from sulfide surfaces.

I. N. Plaksin,¹⁵ in presenting a summary of the research under his direction, suggested that reagents (such as alkylaryl sulfonate) which are good collectors for iron oxides might improve flotation results if used jointly with xanthates. He said that experiments have shown that the joint addition of xanthate and one such compound increased mineral recoveries and permitted the recovery of 95 to 96 pct of the sulfides in the froth without resorting to base-metal salt activation. This method worked quite effectively to increase recovery of the iron-containing dark form of sphalerite. Plaksin further described the effect of employing various gases for selective separation of nonsulfide minerals. He has found some significant results as reported in MINING ENGINEERING (March 1959); his current paper presents the theory for this reaction. He believes that dissolved

oxygen in the pulp can be adsorbed onto the surfaces of minerals such as ilmenite and rutile and that this adsorption enhances their flotation by soap-type collectors. If the oxygen is then removed from solution, particularly by blowing nitrogen through it, the titanium minerals will be strongly depressed. Since this effect is not found on zircon, he suggests this as a possible method for selective flotation of titanium minerals from zircon. His postulates require considerably more elaboration, since they appear to conflict with much of the presently accepted theory pertaining to flotation behavior.

V. I. Klassen,¹² reporting on his experiments with flotation by gas precipitation, found that gas will precipitate from solution more readily on a liquid-solid surface than in the bulk of the liquid, and that the more hydrophobic the surface, the easier will be the precipitation. He suggests that large particles can be more readily floated by a multitude of small bubbles on the surface, as produced by gas precipitation. He stated that coal particles from 10 to 15 mm. in size have been floated under laboratory conditions in a cell fed with a super-saturated solution of gases in water. He has also found, as have others, that the use of gas precipitation techniques is particularly applicable to the flotation of -10μ particles. A third advantage claimed for this process is that in normal flotation by the added use of supersaturated water, fine air bubbles will be precipitated on the surface of the collector-coated minerals and that these particles will then attach more easily to pre-formed air bubbles introduced by mechanical means. Klassen briefly described a combined air-lift and mechanically agitated machine used in the USSR to achieve this purpose. This paper should stimulate some additional development work which may lead ultimately to mechanical improvements in the flotation process.

Maurice Rey¹³ reported his experiments on differential flotation of lead-zinc ores. He studied several effects, including a comparison of grinding in steel ball mills vs porcelain mills, as well as a comparison of a silicious gangue with a carbonate gangue. The results are probably of interest to someone struggling with a difficult problem of lead-zinc selectivity.

FLOTATION PRACTICE

K. S. Blaskett's paper¹⁴ is a progress report on the use of depressants for gangue minerals when floating fine-grained galena from slates and schists containing abundant sericite and chlorite. He has used many of the typical gangue depressants and has found that in certain cases the effectiveness of these depressants may be enhanced by the addition of sulfur dioxide.

In two papers on ilmenite flotation, by Odd Eidsmo and Olav Mellgren¹⁵ and by U. Runolinna and co-workers,¹⁶ the importance of careful conditioning of ilmenite before flotation is emphasized. The Norwegian approach is to condition the ilmenite concentrate at 70 pct solids ahead of each cleaner stage. Both these papers are excellent descriptions of the application of careful test work to operating plants.

J. N. Wilson¹⁷ described a well-planned plant producing feldspar and mica by selective flotation. The steps employed to prevent overgrinding and to recover minerals as coarse as the degree of liberation allows shows the fine hand of F. B. Michell, to whom Wilson has given credit for his technical guidance.

GRAVITY AND DENSE MEDIA SEPARATION

Two papers, one on a study of the motion of particles in a jig bed¹⁸ and another on a study of the operation of shaking tables¹⁹ were reports on experimental studies made in attempts to more fully understand these types of operations.

The Nesbitt and Weavind paper²⁰ on a study of the efficiency of dense media separators used in diamond dressing is most interesting in that it shows that another group has discovered control of media viscosity

is necessary to yield good HMS results. In a South African plant, viscosity control is maintained by the use of a cyclone in the cleaning circuit between the magnetic separator and the densifier. The cyclone operates as a heavy-media unit rejecting coarse silicates into the overflow which are then removed by screening. When necessary, the cyclone underflow is tabled for additional rejection of gangue. By these means, the viscosity in the HMS cone-type vessel is maintained at about 25 centipoises, which appears to be a good operating range for HMS separation. The authors also noted the advantage of Knapsack spherical ferrosilicon medium for making separation at specific gravities above 3.0.

P. Moiset and R. Dartois²¹ presented a paper on heavy media wherein they describe the development and application of a magnetically controlled underflow discharge valve for cone-type vessels. The sink fraction of the cone discharges through an apex pipe surrounded by a magnetic coil. The magnetic medium is retained in the cone by the field set up at this point and the mineral particles force their way downward through the plug of the medium. The authors claim that this system eliminates much of the violent agitation in the cone caused by the normal air-lift type of sink removal system. The magnetic valve is already in use at two plants in the Belgian Congo, one treating manganese ore and the other diamantiferous gravels. At the diamond plant in Bakwanga, Belgian Congo Republic, the valve is automatically controlled from a central control room assisted by televised transmission.

The lively discussion brought forth by the Cohen and Isherwood paper²² on dense media separation in hydrocyclones was undoubtedly an indication of the continuing interest in this new development. Both the paper and the discussion were attempts to analyze the variables of this system in efforts to improve results. The points emphasized were: 1) the maintenance of a constant feed volume, 2) the use of the correct size of apex orifice, 3) the selection of a vortex finder size large enough to prevent a back pressure, and 4) the control of the viscosity of the medium.

As another approach to heavy-media separation, the Israel Mining Industries has developed a process for deriving tetrabromoethane (TBE) directly from Dead Sea brines and claims to have thus assured a large and reasonably priced supply of this heavy liquid for commercial use. The technical-grade liquid has a specific gravity of 2.94. The authors, A. Baniel and A. Mitzmager,²³ envisage industrial heavy liquid separations of minerals in conventional heavy-media vessels and in liquid cyclones. For many separations they have found that pre-treatment of the ore with surface-active reagents makes possible the recovery of the TBE by simple washing and with losses as low as 1 kg of heavy liquid per ton of ore treated. For other applications, naphtha washing is required involving a loss of only 3 kg of naphtha per ton of ore. They state these losses are comparable to the costs of conventional reagents in flotation and dense-media operation. The greatest potential for this material would appear to be in the cyclone application, which operates at a feed size range finer than that possible with a ferrosilicon medium. If the costs can be kept low enough, this may become a significant development in mineral processing for special cases.

Improved treatment methods for Malayan tin ores were described by I. R. M. Chaston.²⁴ By using 24-in. low-pressure cyclones to deslime the feed, a high plant capacity is attained and cassiterite down to as fine as 300 mesh is effectively recovered in jigs.

MAGNETIC AND ELECTRICAL SEPARATION

In the session on magnetic and electrical separation, Fred D. DeVaney's paper²⁵ on new developments in magnetic concentration of iron ores was well received. His description of the newer North American developments in this field created considerable interest. P. G. Kihlstedt²⁶ reported on his work with the Mörtzell-Sala

type of dry magnetic separator, which has already been described in the technical literature. The Mörtzell separator is based on the so-called star magnet with the star formed by permanent magnets of alternating polarity with a field strength normally in the range of 1000 gauss at the surface of the drum.

Improvements in equipment for wet magnetic separation were discussed by G. H. Jones and W. D. Stone.¹⁶ The Jones separator is essentially a set of grooved plates magnetized by strong external electromagnets, through which the pulp flows downward. The operation is conducted in cycles and the device has been found effective both on weakly magnetic materials or on very fine particles down to a few microns in size. A pilot model of this separator has been in use in the Mines Branch, Ottawa, since April 1959. As examples, separations of garnet from quartz, ilmenite from apatite, biotite from kyanite, and hematite from quartz were cited. The reception accorded this paper would seem to indicate that we shall hear more of the Jones separator and its application to commercial use. A somewhat similar French development was discussed under the heading of the Forrer separator, a new apparatus for wet separation of weakly paramagnetic materials.¹⁷ This device has vertical pole pieces through which the pulp flows, allowing the particles to separate on a horizontal plane according to magnetic response. A splitter at the bottom separates the stream into two fractions. To date this separator appears to have been used primarily on test work of Lorraine iron ores. On a feed sized —35 +65 mesh, the separator gave results almost identical with those produced in a dry, toothed-roll, magnetic separator. The authors stated that the Forrer separator appears to be usable as a pre-concentrator and that they are attempting to work out the few remaining details in design and construction of a machine of commercial size.

The paper presented by Barthelemy and Mora¹⁸ discuss high-tension separation as it has been developed in the U.S. In another paper on electrostatic separation, the Russian authors, I. A. Kakovsky and V. I. Revinitzev,¹⁹ concluded that the conductivity of minerals is controlled largely by the humidity of the air surrounding them. For minerals with high specific resistance, the authors stated that the conductivity is chiefly determined by surface conductivity, which in turn largely depends on the physical and chemical condition of the surface and amount of water adsorbed on it. Organic heteropolar material adsorbed on the mineral's surface lessens the amount of moisture adsorbed and sharply decreases the mineral's conductivity. This, they said, can be used to advantage in electrostatic separation.

CHEMICAL PROCESSING

In his paper on the production of high-purity lead by amine leaching, F. A. Forward²⁰ reported another one of his excellent research investigations in this new field in extractive metallurgy. The process makes possible the production of silver-free lead with a purity exceeding 99.99+ pct. The Russian paper²¹ on the development of the autoclave-soda process for the treatment of tungsten concentrates describes in some detail a process that is essentially the same as that now employed by the Union Carbide Nuclear Co. at Bishop, Calif. In addition, the paper contains some information on the use of this process for high-grade scheelite concentrates as well as an unsupported mention that the process may also be applicable to wolframite concentrates. This excellent paper contains a detailed analysis of the chemistry of the process and is a worthy contribution to the technical literature.

A rather complete survey of the uranium ore industry in Australia was presented by the staff of the South Australian Department of Mines.²² The paper makes very enjoyable reading because it describes

in some detail the nature of the ore at the various mines in Australia and shows how variations in the ore control the type of processing required. Leaching, ion exchange, solvent extraction, and solid-liquid separation are discussed. Particular emphasis has been placed on the technical problems encountered and the methods that have been developed to overcome these problems. In another paper on uranium ore treatment, Robert Bodu²³ discusses the current French trend to use a lime precipitation process in which the sulfuric acid leach liquors are treated by a two-stage addition of lime to first precipitate some of the impurities at about pH 2.7 followed by uranium precipitation at pH 6.5 to 7.0. This uranium pre-concentrate can be further purified either by an alkaline or an acid process followed by solvent extraction. The French have found that their process results in higher extractions and lower costs, brought about chiefly by simplified procedures and the elimination of highly corrosive solutions. The paper contains detailed flowsheets of various French plants as well as operating details.

PROCESS STUDY

A number of processes that have been worked out for a variety of ores or special problems were described in this session. In a paper on the technical possibilities of the fluidized bed roasting process for the concentration of Siegerland siderite, W. Hellmund²⁴ reported that the process is technically suitable for that application. The presentation of a magnetizing roasting method for the beneficiation of Indian manganese ores would appear to be another significant contribution to this field by Subramanya, Narayanan, and co-workers.²⁵ The authors have shown how high-iron manganese ores may be converted to a mixture of magnetite and manganous oxide (mostly the latter) by gaseous reduction in the temperature range of 400 to 600°C and then beneficiated by magnetic separation. Their pilot plant studies indicate that the process may be used effectively in conjunction with ferromanganese-producing electric furnaces, and that one of its chief benefits might be its ability to produce a feed with controlled composition for electric furnaces.

F. B. Michell²⁶ described in some detail the flotation removal of sulfide minerals from gravity tin concentrates. Other aspects of his work, both in the field of gravity concentration and of table flotation, were brought out during the post-Congress tour to the tin mines of Cornwall. With his assistance, these ancient tin dressing plants are being modernized so that effective recoveries of cassiterite may be made at sizes down to as fine as 10 μ . The Fleming-Robinson paper²⁷ shows how fundamental research, laboratory testing, and pilot plant operation may be integrated for the development of a workable flowsheet on a difficult ore. The present report covers only the process involving magnetic separation, hydrocyclone desliming, and flotation for the recovery of a high-grade apatite from the Sukulu deposit. The authors did not describe the additional steps they have worked out for recovery of pyrochlore from the apatite tailing.

CONTROL AND TESTING

Those refinements which make possible the attainment of optimum operating results were covered in a series of five papers. Type circuits usable for the unit operations of mineral processing were described by M. J. Cahalan and R. Wolski.²⁸⁻³¹ Three papers³²⁻³⁴ on the application of mathematical analysis to this field appear to contribute some details to techniques that have already been employed. In addition, L. D. Muller³⁵ described the novel laboratory tools he has devised for ore dressing mineralogy. Several of these, including his micropanner (a miniaturized version of the Haultain super-panner, small enough to fit on the stage of a microscope) will undoubtedly become tools of general use in ore-testing laboratories.

PAPERS PRESENTED AT THE INTERNATIONAL MINERAL PROCESSING CONGRESS, APRIL 6-9, 1960

COMMINUTION

- ¹ Fundamental Study of Grinding Characteristics of Tumbling Mills: R. T. Hukki, State Institute for Technical Research, Helsinki, Finland.
- ² Theoretical Concepts of the Aerofall Mill with Illustrations of Plant Practice: D. Weston, Aerofall Mills Ltd., Toronto, Canada.
- ³ Grinding Tests on Magnetite Ores with Aerofall Mill and with Dry and Wet Rod Mills: B. Fagerberg and H. Ornstein, Luossavaara-Kiirunavaara Aktiebolag, Malmberget, Sweden.
- ⁴ Open and Closed Circuit Grinding on a Laboratory Scale: D. G. Armstrong, The General Electric Co., Erith, England.
- ⁵ Preliminary Report on Grinding Tests in a Vertical Laboratory Mill: P. Westerlund, Outokumpu Oy, Misi, Finland.

CLASSIFICATION AND THICKENING

- ⁶ On the Mechanism of Thickening: A. M. Gaudin and M. C. Fuertes, Department of Mineral Engineering, Massachusetts Institute of Technology, Cambridge, Mass.
- ⁷ Design and Performance of Cyclone Thickeners: D. Bradley, Chemical Engineering Div., Atomic Energy Research Establishment, Harwell, England.
- ⁸ Distribution of Water in Large-Diameter Cyclones Under Operating Conditions: C. G. Peache, Chemical and Metallurgical Consultant, Johannesburg, South Africa.
- ⁹ Improvement of Classification Efficiency in Hydraulic Cyclones by Water Injection: D. F. Kelsall, CSIRO, Melbourne, Australia, and J. A. Holmes, Rhokana Corp., Kitwe, Northern Rhodesia.
- ¹⁰ A Process of Centrifugal Separation Using a Rotating Tube: G. Ferrara, Istituto di Arte Mineraria e Preparazione dei Minerali, University of Cagliari (Sardinia), Italy.

FLOTATION RESEARCH

- ¹¹ Kinetics of Flotation Reagent Sorption: O. S. Bogdanov, A. K. Podnech, V. I. Hainman and N. S. Mikhaleva, Institute Mekhanobr, Leningrad, USSR.
- ¹² Physical Stability of Collector Adsorption Layers on Mineral Surfaces, and Methods for Their Destruction: V. A. Giembotzky, Laboratory of Flotation and Flotation Reagents, Institute of Mining, Academy of Sciences of the USSR, Moscow.
- ¹³ Study of Superficial Layers of Flotation Reagents on Minerals and the Influence of the Structure of Minerals on Their Interaction with Reagents: I. N. Plaksin, Head, Section of Mineral Dressing of the Institute of Mining, Academy of Sciences of the USSR, Moscow.
- ¹⁴ Kinetic Investigation of the Effect of Contact Time, Temperature and Surface Condition on the Adhesion of Bubbles to Mineral Surfaces: M. A. Eglees and M. L. Volova, Mineral Research Institute, Ministry of Geology and Protection of the Mineral Resources of the USSR.
- ¹⁵ Wetting of Solid in Solutions of Surface-Active Substances as a Function of Solute Concentration: M. Wada, Professor of Mineral Dressing, Tohoku University, Japan.
- ¹⁶ Theoretical Basis of Flotation by Gas Precipitation: V. I. Klassen, Laboratory of Mineral Dressing, Institute of Mining, Academy of Sciences of the USSR, Moscow.
- ¹⁷ On the Interpretation of Contact Angle: J. Leja and G. W. Poling, Department of Mining and Metallurgy, University of Alberta, Canada.
- ¹⁸ Some Factors Affecting Selectivity in the Differential Flotation of Lead-Zinc Ores Particularly in the Presence of Oxidized Lead Minerals: M. Rey, Ecole Nationale Supérieure des Mines, and Société Minière et Métallurgique de Penarroya, Paris; V. Formanek, Minéraux et Métaux, Paris, France.

FLOTATION PRACTICE

- ¹⁹ Some Effects of Depressants in the Flotation of a Lead Ore: K. S. Blaske, CSIRO Ore Dressing Investigations, Melbourne, Australia.
- ²⁰ Some Factors Which Influence Ilmenite Flotation at Titan A/S, Norway: O. Eidsmo, Titan A/S, Norway, and O. Melgren, Royal School of Mines, London, England.
- ²¹ Agglomeration Flotation of Ilmenite Ore at Ottanmäki: U. Ruottine, R. Rinne, and S. Kuronen, Ottanmäki Oy, Finland.
- ²² Flotation of Brown Iron Ores and Silimes From Gravity Treatment of Manganese Ores: Z. S. Bogdanova, S. I. Gorlovsky, and B. M. Lakota, Institute Mekhanobr, Leningrad, USSR.
- ²³ Feldspar-Mica Separation: An Unusual Flotation Flowsheet: J. N. Wilson, Colin Stewart Ltd., Winsford, Cheshire, England.

GRAVITY AND DENSE MEDIA SEPARATION

- ²⁴ A Study of the Motion of Particles in a Jig Bed: G. D. Lill, United Steel Companies Ltd., Research and Development Department, Swindon Laboratories, Rotherham, England; H. G. Smith, Leeds University, England.
- ²⁵ Studies of the Oscillation of Shaking Concentration Tables: H. Kirchberg and W. Berger, Bergbauinstitut für Aufbereitung, Freiberg, Saxony, Federal Germany.
- ²⁶ Study of Efficiency of Dense Media Separators Used in Diamond Dressing: A. C. Nesbitt and R. G. Weenink, Diamond Research Laboratory, Johannesburg, South Africa.
- ²⁷ Magnetic Regulation of Underflow Discharge of a Dense Media Washing Cone: P. Moiset, Department of Mines, Faculté Polytechnique de Mons, Belgium; R. Dertois, Université du Travail à Charleroi, Belgium.

- ²⁸ Principles of Dense Media Separation in Hydrocyclones: E. Cohen, Department of Mineral Dressing, Royal School of Mines, London, England; R. J. Isherwood, The Iron Ore Co. of Canada, Quebec.
- ²⁹ Developments in the Treatment of Malayan Tin Ores: I. R. M. Chaston, Department of Mines, Research Div., Ipoh, Federation of Malaya.
- ³⁰ Use and Recovery of Tetra bromoethane (TBE) in Mineral Dressing: A. Boniel and A. Mitzmager, Israel Mining Industries, Haifa, Israel.

MAGNETIC AND ELECTRICAL SEPARATION

- ³¹ New Developments in the Magnetic Concentration of Iron Ores: F. D. DeVane, Pickands Mather & Co., Duluth, Minn.
- ³² Concentration of Magnetite Ores with Dry Magnetic Separators of Mortise-Sala Type: P. G. Kihlstedt and B. Skold, Royal Institute of Technology, Stockholm, Sweden.
- ³³ Magnetizing Reduction in a Recuperative Rotary Furnace: S. Ekeroth, Research Department, Stora Kopparbergs Bergslags Aktiebolag, Domnarvet, Sweden.
- ³⁴ Wet Magnetic Separation for Feeble Magnetic Minerals: I—Description and Theory: G. H. Jones, Department of Mechanical and Electrical Engineering, Camborne School of Metaliferous Mining, Cornwall, England. II—Application to some Canadian Mineral Dressing Problems: W. J. D. Stone, Department of Mines and Technical Surveys, Mineral Processing Div., Ottawa, Canada.
- ³⁵ The Forrer Separator: A New Apparatus for Wet Separation of Weakly Paramagnetic Materials: J. DeRobert and L. Casenot, Institut de Recherches de la Sidérurgie, Maizières-lès-Metz, Moselle, France.
- ³⁶ Electrical High Tension Minerals Beneficiation: Principles and Technical Aspects: R. E. Barthelemy, Consulting Engineer, Jacksonville, Fla.; R. G. Mora, Institut de Recherches de la Sidérurgie, Maizières-lès-Metz, Moselle, France.
- ³⁷ Effects of Surface Conditioning on the Electrostatic Separation of Minerals of Low Conductivity: I. A. Kakovsky, Ural Polytechnic Institute, and V. I. Revintsev, Research Institute Uralmekhanobr, Sverdlovsk, USSR.
- ³⁸ An Optical Method of Separating Diamonds from Opaque Gravels: A. A. Linari-Linholm, Diamond Research Laboratory, Johannesburg, South Africa.

CHEMICAL PROCESSING

- ³⁹ Production of High Purity Lead by Amine Leaching: F. A. Forward, Department of Mining and Metallurgy, University of British Columbia, Canada; H. Veitman and A. Vizsolyi, Sherritt Gordon Mines Ltd., Canada.
- ⁴⁰ Development of the Autoclave-Soda Process for the Treatment of Tungsten Concentrates: N. N. Maslenitsky and P. M. Perlov, Institute Mekhanobr, Leningrad, USSR.
- ⁴¹ Pressure Leaching of Some Silicate Minerals in Alkali Solutions: A. R. Burkis, Department of Mineral Dressing, Royal School of Mines, London, England.
- ⁴² Technical Aspects of Uranium Ore Treatment in Australia: Staff of the Research and Development Branch, South Australian Department of Mines, Adelaide, Australia.
- ⁴³ Recent Development in the Chemical Treatment of Uranium Ores in France: R. Bodu, Research and Mineral Exploitation Branch, Atomic Energy Commission, France.

PROCESS STUDY

- ⁴⁴ Technical Possibilities of the Fluidized Bed Roasting Process for the Concentration of Siegerland Siderite: W. Hellmund, Erzbergbau Siegerland A.G., Betzdorf, Western Germany.
- ⁴⁵ Beneficiation of Low-Grade Manganese Ores, with Particular Reference to Semi-Pilot-Plant Studies on a Low-Temperature Magnetizing Reduction Process for Ferruginous Manganese Ores: G. V. Subramanya and P. I. A. Narayanan, National Metallurgical Laboratory, Jamshedpur, India.
- ⁴⁶ Application of Flotation in the Clean-Up of Gravity Tin Concentrates: P. B. Michell, Camborne School of Metaliferous Mining, Cornwall, England.
- ⁴⁷ Development of a Process for the Concentration of Sukulu Apatite: M. G. Fleming, Royal School of Mines London; A. J. Robinson, Warren Spring Laboratory, Stevenage, England.

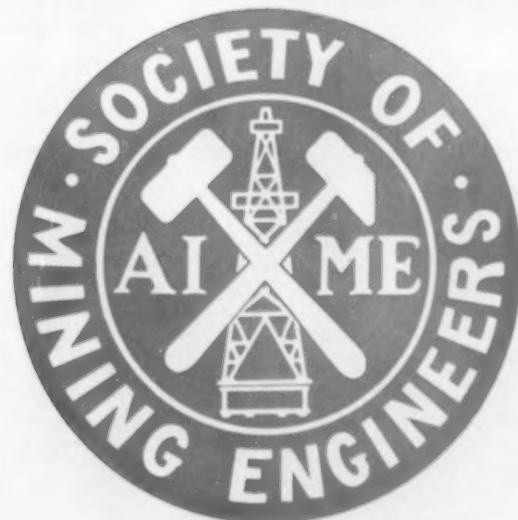
CONTROL AND TESTING

- ⁴⁸ Automatic Control in Mineral Processing: M. J. Cahalan, Rio Tinto Management Services (U.K.) Ltd.; R. Woiski, Systems Study Group, Elliott Bros. Ltd., London, England.
- ⁴⁹ Separation Factor Analysis for Mineral Dressing Processes: M. Digre, Mineral Dressing Laboratory, Institute of Technology, Trondheim, Norway.
- ⁵⁰ Statistical Analysis of Some Variables in Batch Flotation Testing, Leading to the Design of an Improved Laboratory Cell: P. Raffinot, Minerals et Métaux, Paris, France.
- ⁵¹ Linear Assessment of Flotation Results: W. H. Andrews, The Zinc Corp., Broken Hill, Australia.
- ⁵² Some Laboratory Techniques Developed for Ore Dressing Mineralogy: L. D. Muller, Warren Spring Laboratory, Stevenage, England.

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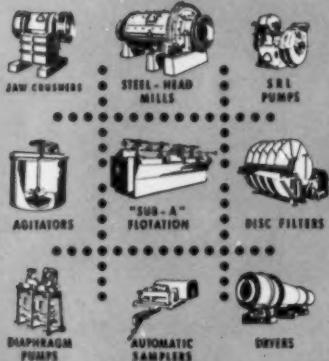
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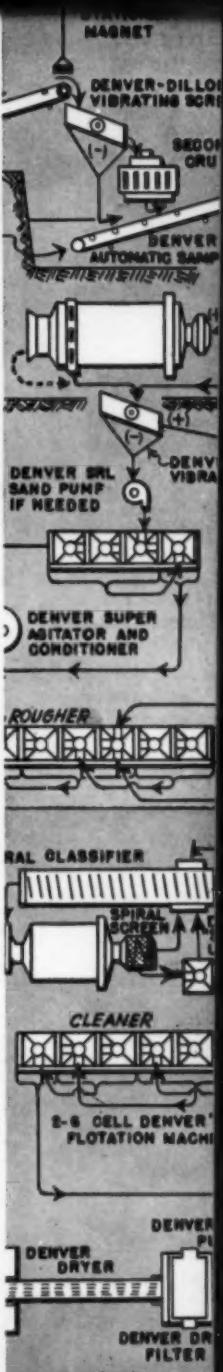
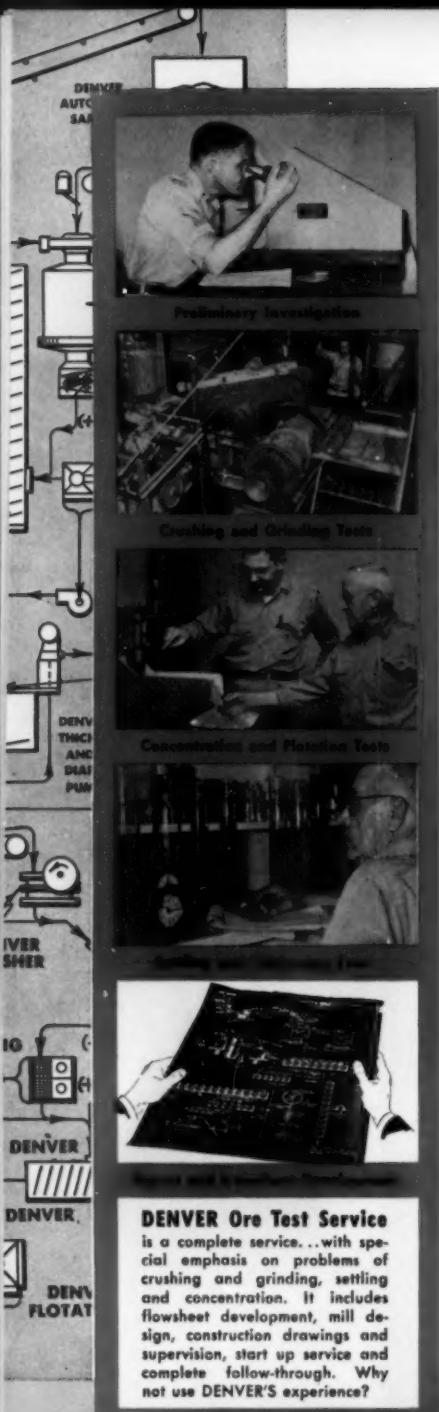
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The numerals following member's grade indicate year of election.

The letter following year of election indicates primary Divisional affiliation:

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G—Petroleum

C—Iron and Steel

H—Industrial Minerals

D—Extractive Metallurgy

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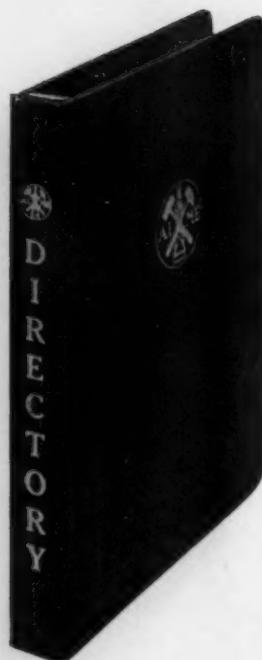
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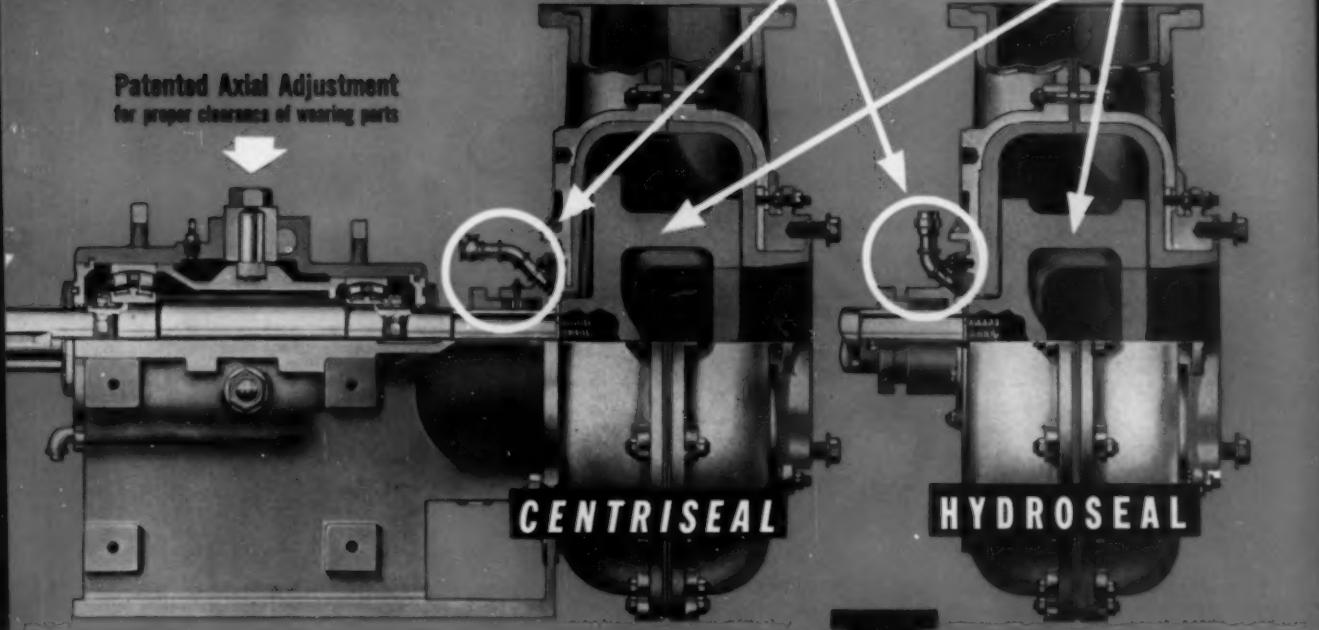
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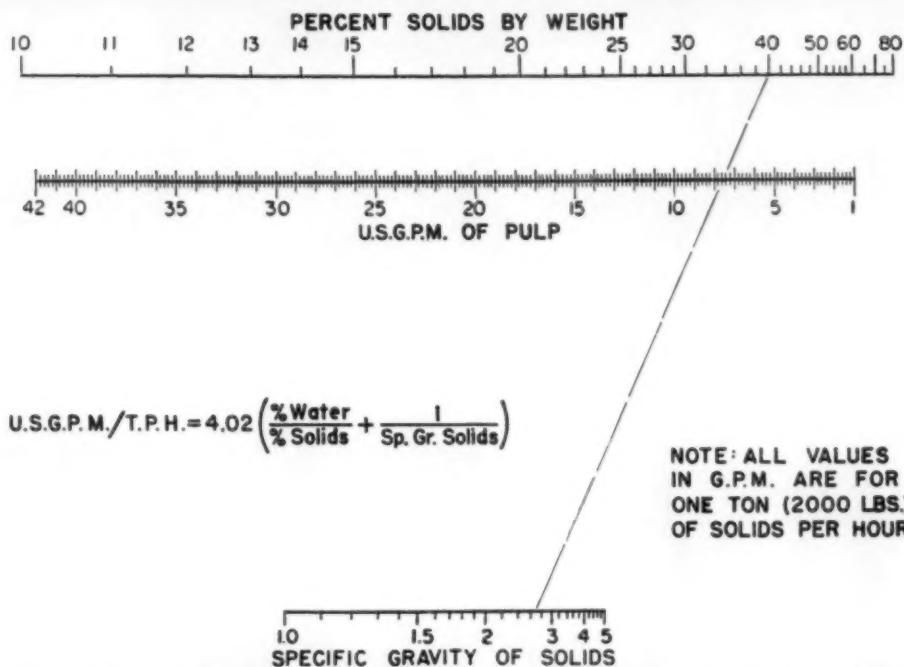


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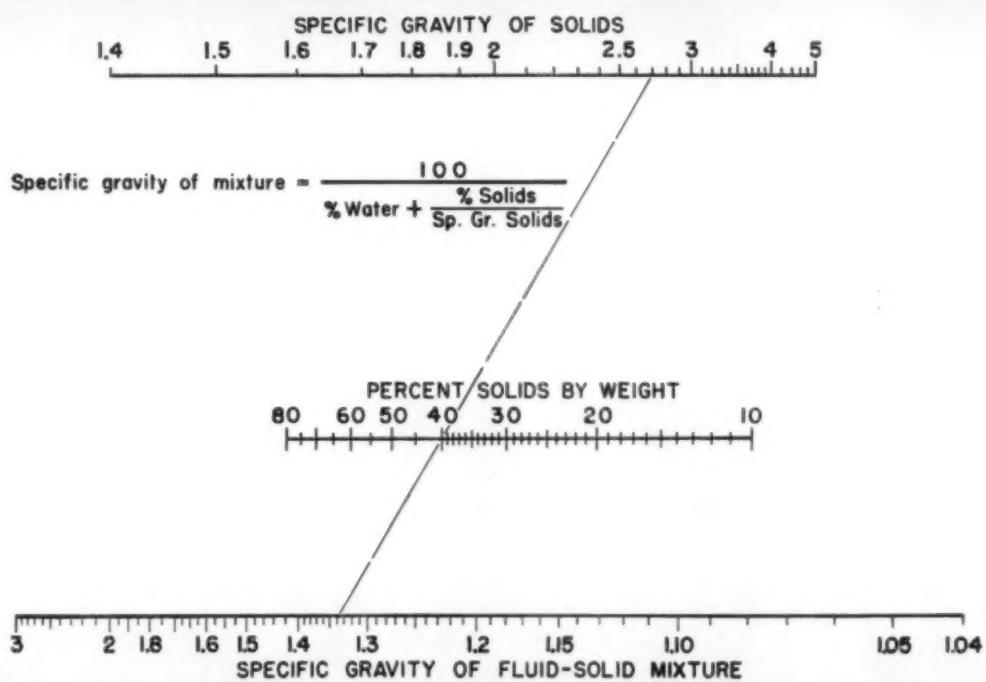
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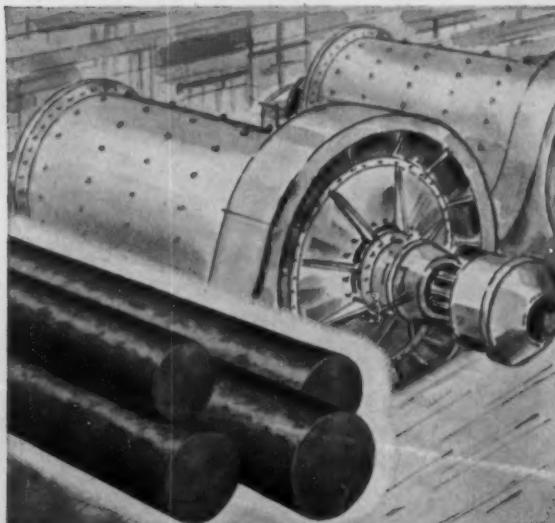


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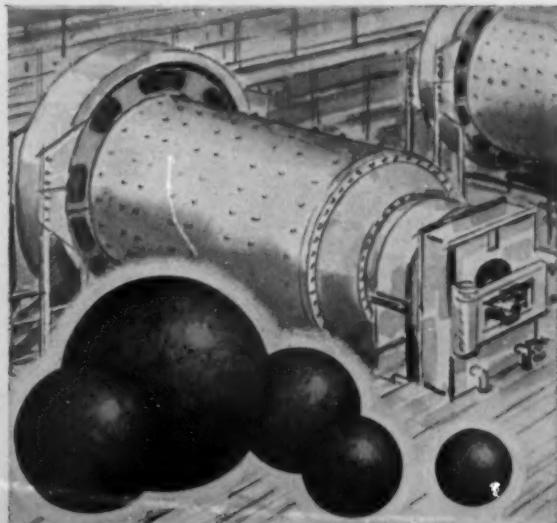
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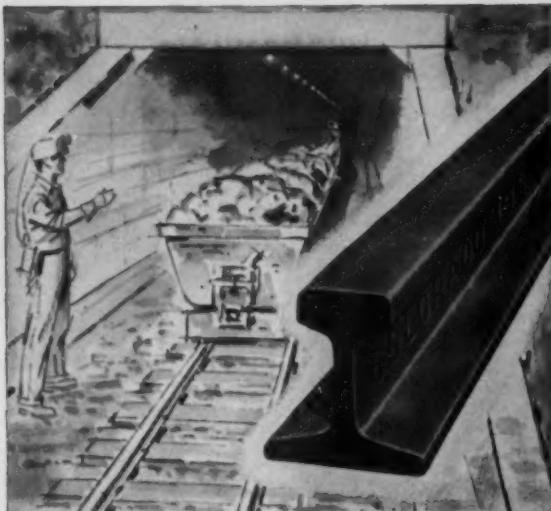
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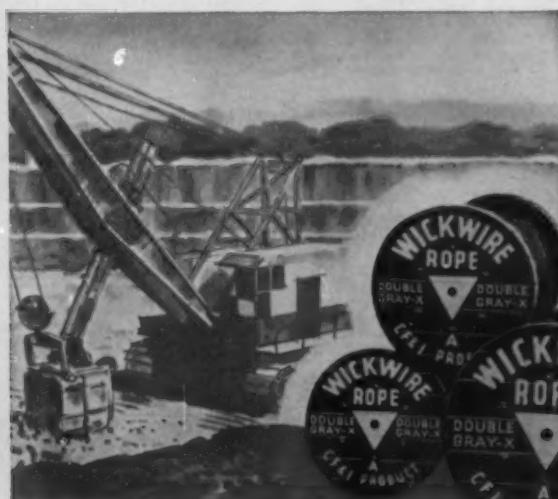
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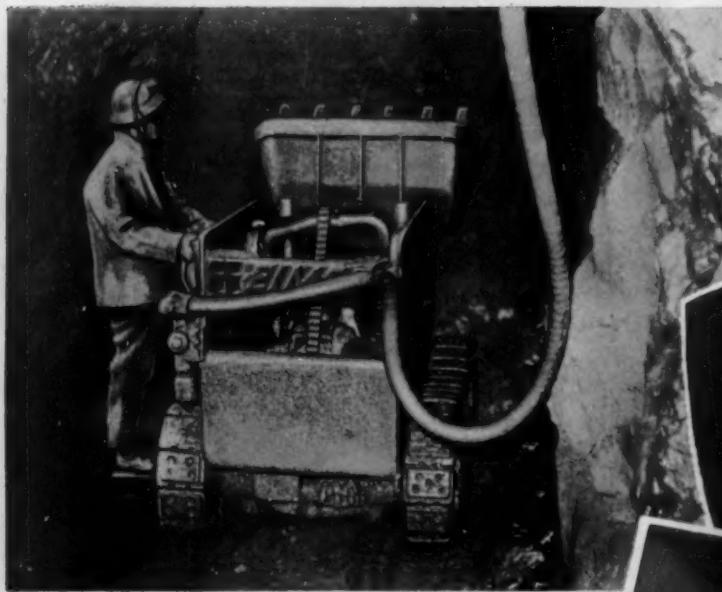
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Pres, ASEA Electric Inc., 500 Fifth Ave., New York 36, N. Y.
- Zeuch, Clarence F., M31 B
Sr Met, The Dow Chem. Co., 800 Wilshire Blvd., Los Angeles 17, Calif.
- Zevallos, Hipolito, J58
Cerro De Pasco Corp., Hotel Junin, La Oroya, Peru
- Zibell, J. Scott, M58 H
Ch Engr, Asso Dir Res, The Ga. Marble Co., Tate, Ga.
- Zichell, A. Howard, M38
Mgr, Northwest Magnesite Co., Chewelah, Wash.
- Ziegfeld, Robert L., M45 A
Secty-Treas, Lead Industries Association, 292 Madison Ave., New York 17, N. Y.
- Ziegler, Jay R., J55 H
Geol, Riverton, Neb.
- Ziehl, Othon, M35
8115 Highland Pl., Munster, Ind.
- Ziesing, Gordon, J57
2258 Stecher Ave., Union, N. J.
- Zievers, James F., A59 B
VP, Ind. Filter & Pump Mfg. Co., 8800 Ogden Ave., Cicero, Ill.
- Zijderveld, P. H., M28
Legacion de Holanda, Aptdo 4100, San Jose, Costa Rica
- Zilbersher, William M., M47 H
Olin Matheson Chem. Co., 460 Park Ave., New York, N. Y.
- Zima, Albert G., M41 B
Suprv, Intl. Nickel Co., 714 W. Olympic Blvd., Los Angeles 15, Calif.
- Zima, Pavel, J52 A
Ming Engr, R. R. Box 458, Ringwood, N. J.
- Ziminsky, George L., J53 A
Purch Agent, Atlas Powder Co., Wilmington 96, Del.
- Ziminiski, Richard W., J54
R. F. D. 1, Treadway, Tenn.
- Zimmer, Paul W., M39 A
Sr Geol, M. A. Hanna Co., Iron River, Mich.
- Zimmer, Peter F., J58
339 Princeton Rd., Union, N. J.
- Zimmerley, S. R., M40
Kencoreet Res. Center, P. O. Box 1650, Salt Lake City 10, Utah
- Zimmerman, H. O., M44 F
Mgr, Coal Properties, Inland Steel Co., Wheelwright, Ky.
- Zimmerman, M. Jordan, J52 A
Sr Design Engr, The Martin Co., Denver, Colo.
- Zimmermann, R. A., J56
75 Athol St., Springfield, Mass.
- Zimmerman, R. E., M38
Engr. & Const. Koppers Co., Freyn Dept., Koppers Bldg., Pittsburgh 18, Pa.
- Zink, Charles G., M43 F
Indust Sales Mgr, Hudson Coal Co., 424 Wyoming Ave., Scranton, Pa.
- Zinki, Andrew J., M34 A
1602 N. Campbell St., Prescott, Ariz.
- Zinn, Justin, M43 A
Prof, Mich. State Univ., East Lansing, Mich.
- Zinner, Paul, M41 A
Asst Dir, Programs, U. S. Bur. of Mines, Interior Bldg., Washington, D. C.
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Matis Engr, Pa. Dept. of Hwy., 449 Montgomery Ave., Haverford, Pa.
- Zinter, Theodore C., M55 B
Dist Mgr, Hewitt-Robins, 85 New Montgomery St., San Francisco, Calif.
- Ziolkowski, Edward F., J53 A
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1318 Madison St., Butte, Mont.
- Zironi, Francis V., M30 A
Gral Supt, Neg. Mra. de Azufre, S. A., Apartado 12, Cerritos, S.L.P., Mexico
- Zobitz, Edward, A59 A
Res Mine Engr, Snyder Ming Co., W. P. Snyder & Co., Oliver Bldg., Pittsburgh, Pa.
- Zoerber, Howard M., M48 B
Cons Engr, Nordberg Mfg. Co., 3073 S. Chase Ave., Milwaukee 7, Wis.
- Zona, Anthony, J57
318 Gaston Ave., Fairmont, W. Va.
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Zontelli Bros. Inc., Ironton, Minn.
- Zuppis, Renato, M51
Casella Postale 108, Merano, Italy
- Zubrzycki, Piotr P., A52 A
Consult Geol, Casilla 2554, La Paz, Bolivia
- Zuercher, Edgar M., M56 B
Mgr Test Plant, Hardinge Co. Inc., 240 Arch St., York, Pa.
- Zukow, Peter J., M33 A
Mine Supt, U. S. Steel Corp., Tenn. Coal & Iron Div., P. O. Box 599, Fairfield, Ala.
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Cleveland Quarries Co., Amherst, Ohio
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Anaconda Co., Grants, N. M.
- Zuniga y Guzman, Emilio, M53 A
Dir Gerente, Sociedad Minas de Huacchaca, General Garzon 1971-3, Lima, Peru
- Zunino, John, A56
Box 434, Ely Nevada
- Zurbrigg, H. F., M52
33 Creighton Rd., Copper Cliff, Ont., Canada
- Zwermann, Carl H., M40 H
808 W. Main St., Robinson, Ill.
- Zwick, Walter H., M47 A
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- Zwickley, Wayne E., J54 A
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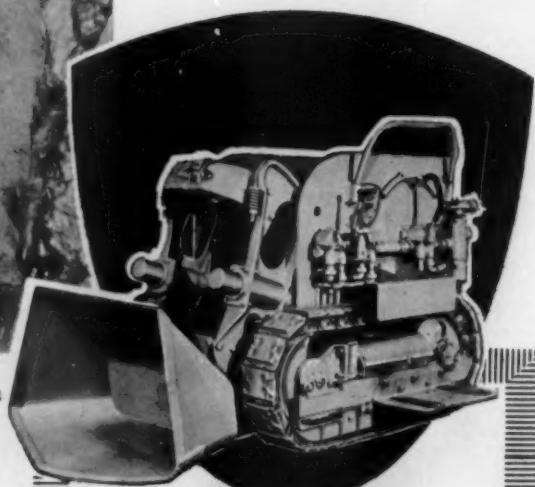
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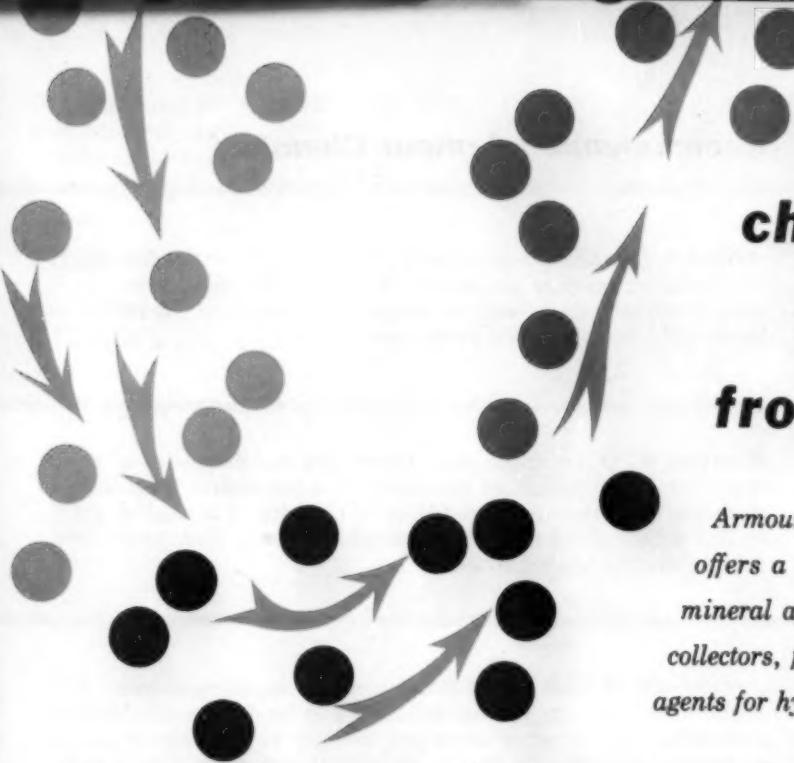
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Mica, Spodumene and Feldspar from pegmatites
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Sylvite from Halite

Bulk flotation: Heavy minerals from beach sands

Flotation:

Silica from Phosphate Rock
Mica, Spodumene and Feldspar from pegmatites
Iron-bearing minerals from glass sands
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Bulk Flotation: Heavy minerals from beach sands

Flotation:

Silica, Mica and Pyrite from Calcite or Kyanite
Silica from Iron Oxides
Monazite from a variety of heavy minerals

Flotation:

Silica, Mica and Pyrite from Calcite or Kyanite
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Armac® T (tallow amine acetate)—a technical grade amine salt between 95% and 102% neutralized. It is a medium-hard solid. At 25°C it can be used as a 5% water solution producing a pH of about 7. At this solution it is also an anti-caker of hygroscopic materials, even when applied to moist surfaces.

Armeen® T (tallow amine)—a technical grade amine that is a medium-hard solid. It can be used straight when blended with frother or secondary collector (usually 2 parts amine to 1 part solvent). Or it can be used when neutralized with acetic acid or hydrochloric acid and solubilized in water. When heated to its free-flowing temperature, straight Armeen T functions as a conditioning agent for anti-caking hygroscopic salts or formulations.

Armac C (coco amine acetate)—another technical grade amine salt between 95% and 102% neutralized. This one is a soft and pasty solid that can be used as a 25% water solution at 25°C. Armac C is recommended for applications in which mineral sizing is fine, or where sharp mineral selectivity is desired.

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Mineral applications

Recommended Armour Chemical

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Sylvite from Halite

Armeen TD (tallow amine, distilled)—the equivalent of Armeen T, but higher in primary amine content and a quite-hard solid. It is neutralized with acetic acid or hydrochloric acid, then solubilized to about a 5% water solution before use.

Flotation:

Sylvite from Halite

Conditioner:

Anti-caking agent for Sylvite

Armeen HTD (hydrogenated tallow amine, distilled)—a hard, waxy, completely saturated derivative of tallow amine. Less soluble and more inert than Armeen TD. As a collector, it is used as a 1% water solution of the acetate or hydrochloride salt. As a conditioner, it is melted and applied straight.

Flotation:

Mica and Feldspar from pegmatites

Silica from Phosphate Rock

Armoflate® 54-38 and 58-22 (amines in nitrogen-based solvents)—chemicals to be used straight in flotation circuits, blended with either the frother or secondary collector to aid their dispersion in the pulp. Armoflate 54-38 is liquid at 90°F, Armoflate 58-22 at 60°F.

New Product Applications

Anti-caking—Anti-dusting

Armoflo® 48 and 65—Armour Armoflo 65 (cationic) and Armoflo 48 (anionic) are new formulations. Both are liquid at normal temperatures with melt points of 5°C or below. They are sprayed or dripped as received in applications for:

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- (2) the control of dusting in plants where grinding or rolling systems result in abrasion of particles with subsequent dusting.
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Write us for samples and technical bulletins. Armour's Technical Service Department will also be happy to help you determine the proper chemical for your specific mineral need.



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Neason, James E.

ALBERTVILLE

Thompson Floral Co.
Loudermilk, E. L.

ANNISTON

No Data Supplied
Bonnichsen, Bill

BESSEMER

U. S. Steel Corp.—TCI Div.
Beck, Adolph W., Jr.
Boyle, James H.
Cofield, William H.
*Evans, James D. F., II
*Guyton, Jesse C.
Johnson, Leiland H.
Tetley, Albert L.
No Data Supplied
Crockard, F. H.
Fisher, Joe T.
Griffin, Joseph M.
McFarland, E. A.
Mohr, Henry E.
Neal, George M.
Walker, Wilber D.

BIRMINGHAM

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Dyar, Grosvenor C.
Hager, Henry Jordan
*Latham, Allen
Miller, Robert J.
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*Fies, Milton H.
Hagy, James A.
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Black Diamond Coal Min. Co.
Blair, Clarence B.
Blair, Charles S.
Blair, Robert J.
*Miller, Ivan W.
Brilliant Coal Co.
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*Burns, S. G.
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Cowin Equipment Co., Inc.
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*Dodd, Dorace C.
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*Humbard, Richard A.
Goodman Mig. Co.
*Reese, Charles D.
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*Cowin, Percy G.
*Kirk, Ralph E.
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Robertson, Otto L., Jr.
Pratt Coal Co.
*Haskell, Preston H., Jr.
Republic Steel Corp.
Hilleke, August F., Jr.
Watt, Ralph B.
Rivers Equipment Sales
Rivers, Curtis F.
Shook & Fletcher Supply Co.
Bynon, George
Cobb, Howard
Gunter, Howard C.
Shook, Alfred M., III
Southern Elec. Gen. Co.
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*Burnett, Andrew E.
Southern Research Inst.
Dismukes, Edward B.
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State of Alabama
Williams, Henry T.

Transall Inc.
*Spurgeon, Samuel J.
U. S. Bureau of Mines
McCall, Milton C.
U. S. Pipe & Fdy. Co.

Britton, Sam A.
Cassidy, P. M.
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Marchich, Michael M.
McNutt, William P., Jr.
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*Bridge, Terrell S.
Gegg, Edgar J.
*Miller, Grover C.
Tamblyn, Edwin W.
Univ. of Alabama
*Dupuis, Francis J.
Vulcan Materials Co.
House, H. Harris
No Data Supplied
Baker, E. L.
*Blair, Arthur J.
Blair, H. W.
Burke, Herman S., Jr.
Burke, Boles, Jr.
Castellito, Thos. P.
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Crawford, Henry R.
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Dodge, D. D.
Doyle, James N.
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Fowler, Wm. W., Jr.
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Hill, Dewey W.
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*Hobson, Willis E.
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Temple, Robert A.
Tidmore, Erskine
Tipper, John P.
Travis, Dan Freeman
Turner, William R.
Weed, J. K.
Wiggins, Carl

DOCENA

U. S. Steel Corp.—TCI Div.
Layman, Owen N.

EUFAULA

Harrison-Walker Ref.
*Laing, Earl D.

FAIRFIELD

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Hayes, Willie
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Allen, John D.
Andrews, Joe W.
Armstrong, Charles H., Jr.
*Buckingham, Howard B.
Burlette, Robert E.
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Carnes, Donald P.
Chabot, L. S.
Copeland, Billy B.
Creveling, James G.
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Filer, Alvin V., Jr.
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Glasgow, Walter H., Jr.
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*Holloway, Claude L., Jr.
Huey, James L.
*Johnson, Richard B.
Kerley, Henry E.
Kinney, James W., Jr.
*Kirkwood, Walter R.
Laborde, R. J.
Lanier, Monroe B., II
Love, Louie L.
*Malone, Floyd R.
Marshall, Robert T.

McEniry, Ralph W.
McKenzie, William C.
*Messina, Paul J.
Moore, Melvin C.
Morris, James C.
Meyers, Wm. H.
Palestini, Louis A., Jr.
Perry, Morton H.
Pitesa, Dale
Postell, George W., Jr.
Read, Eugene P.
Roberts, Gordon L.
Salter, Marvin L.
*Schlick, J. Reid
*Scott, J. Watts
Shaffer, Chas. E.
Springer, William S.
Sutton, Glen W.
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*Tate, Robert D.
Thomas, E. L., Jr.
Waldrup, Thomas L.
White, Richard S.
Wickstrom, Walter W.
*Zukow, Peter J.

No Data Supplied
Clifton, Ben C.
Herren, Elijah O.
Ray, Charles W.
Roberts, S. Jay
Towers, Ralph

FLAT ROCK

No Data Supplied
Peet, Ben E.

FOLEY

No Data Supplied
Lacey, Richard C.

GORGAS

Alabama Power Co.
*Boggs, Delbert L., Jr.
Harsany, John
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Hutchings, T. E.
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HEFLIN

Dixie Mines Inc.
Bailey, Joe W.

HOMWOOD

No Data Supplied
Culwell, F. B.

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No Data Supplied
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Herren, Clarence E.
McCullar, Barney

HUNTSVILLE

No Data Supplied
Donnini, James M.
Zarzavatian, P. A.

JASPER

Bankhead Mining Co., Inc.
*Cobb, William F.
No Data Supplied
Caskie, Hamilton B.

LEEDS

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MOBILE

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*Riggs, William A.

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Twin Seam Min. Co.
Shook, George A.
No Data Supplied
Bingham, Clarence P.

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Geological Survey of Alabama

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Univ. of Alabama
*Ahrenholz, H. William

*Cudworth, Jas R.

*Shotts, Reynold Q.

No Data Supplied

Alford, James T.
Clements, D. W., Jr.

Sierte, Harry L.
Lambert, Chris A., Jr.

U. S. Bureau of Mines

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*Gandrud, Bennie W.

Rampacek, Carl

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Woodward Iron Co.

Bond, William R.

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Smith, Earl P.

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*Anderson, Burton L.

Erickson, Walter A.

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Collier, Clark L.

Federal Aviation Agy.

Parent, Amand

Renshaw & Sons

*Renshaw, Anson LeVake, Jr.

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*Strandberg, Edward Odin

*Strandberg, Harold D.

Strandberg, Wm. J.

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*Atwood, William F.

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*Zaegele, William G.

No Data Supplied

Bachner, John G.

Bachner, Karl A.

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Boyd, Robert J.

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*Herbert, Charles F.

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Hill, Harry J.

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No Data Supplied

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No Data Supplied

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*Huber, Douglas W.

*Patty, Ernest N.

*Sandvik, Peter O.

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No Data Supplied

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SKAGWAY

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Tunley, A. T.

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No Data Supplied

Corr, Tommy

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No Data Supplied

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Stein, D.

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Collins, Clifford P.

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*Shallit, A. Ben

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*Colp, Douglas B.

*Mathews, Ted C.

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*Thomas, Merl F., Jr.

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Bread, Denny G.

Waughman, Wm. L.

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Lomen, Alfred J.

No Data Supplied

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*Bryant, Robert C.

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Lotus, T. A.

MacDonald, D., III

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Ringstad, Mark B.

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Alaska Dept. of Mines

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Williamson, James A.

Burdill, Willow M.

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McFarland, Cole E.

New York-Alaska Gold

Dredging Corp.

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Dredging Corp.

*Rice, William H.

U.S. Bureau of Mines

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*Mihalek, Miro

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Thorne, Robert L.

U.S. Forest Service

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No Data Supplied

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Pittman, Tom L.

Tucker, Robert L.

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RED DEVIL

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*Lyon, Robert F.

Markle, Roger A.

No Data

Alaska-Arizona

No Data Supplied
Kalmbach, George F.
Koropp, John
Nelson, Leonard F.
Wilcox, Donald Glen

SUTTON

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Moor, Julius H.
Mrak, William

TALKEETNA

No Data Supplied
Powell, William S.

UNALAKLEET

Bliss & Sons
Bliss, Patrick J.

USIBELLI

Usibelli Coal Mine Inc.
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WISEMAN

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Leonard, Harry B.

ARIZONA

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Crawford, Douglas J.
Decl, David A.
Denny, Frank W.
Dixon, Donald Wm.
Gensman, Owen A.
Glenn, Raleigh E.
Hickman, David M.
Hinton, Troy B.
Hunter, Wm. C.
Jones, J. Stanley
Keener, Wm. H.
Littrell, Jimmie A.
Lyons, Alex H.
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Northrup, Allen L.
O'Neill, John E.
Price, Walter L.
Rhoades, Richard E.
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Savory, Donald W.
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Smith, James C.
Sullivan, William T.
Thomas, William J.
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Wood, Morris S.
Wyatt, John H.
Yentzer, W. C.
No Data Supplied
Fenzl, Orazio F.
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Herndon, Thomas R.
Higgins, Blaine
Hoppe, Harry M., Jr.
Sparkman, W. T.
Sudler, John M.
Young, Joe R.

BAGDAD

Bagdad Copper Corp.
Eogart, Robert C.
Jones, Edward L., III
Cyprus Mines
Hunt, Alvin W.
Sierakoski, Joe O.
Sundeen, Curtis R.
Yundt, L. D.
No Data Supplied
Guest, Gaylen W.

BENSON

Apache Powder Co.
Crawford, Howard D.
Towle, Louis W.
Phelps Dodge Corp.
Allen, Phil F.
Clark, Henry D., Jr.
Crowley, James S.
Dahlke, Gustav A.
Durrenberger, Joseph W.
Himebaugh, A. E.
Hogue, William G.
Holmes, Stanley C.
Kolessar, Joseph, Jr.
Ladd, John H.
Larsen, Joseph U.
Little, William W.
Metz, Harry E.
Phillipi, Fred L.
Pollman, William F.
Rounds, Elbert E.
Sellers, J. K.
Shelton, Thomas L.

No Data Supplied
Travis, George E.
Van Etten, George A.
Wenner, Conrad A.
Goar, William
Pincock, W. K.
Riddeil, Richard D.

CASA GRANDE

Transarizonas Resources, Inc.
Ballam, Jack C.
Freeman, George A.

CHANDLER

No Data Supplied
Hawn, George

CHINO VALLEY

No Data Supplied
MacLeod, Lester R.

CLAYPOOL

Harold D. Maryott & Co.
Maryott, Harold D.

CLIFTON

No Data Supplied
Berry, Tom W.

CLIFTON

Willis-Construction Co.
Willis, Oscar Brice

CONGRESS

U. S. Tungsten Corp.
Zannaras, John P.
Hawley and Hawley, Inc.
Nicholas, Howard B.
Leverett, Davis & Assoc.
Allen, William R., Jr.

DOUGLAS

Phelps Dodge Corp.
Allan, James W.
Davis, John H., Jr.
Genelli, Peter S.
Klein, Leonard
Lawson, Walter C.
Ludden, Robert B.
Ludden, R. W., Jr.
Mallott, Elmer A.
McGuire, Cecil E.
Miller, Charles P.
Puller, Jack B.
Smith, Arthur R.
Summer, John S.
No Data Supplied
Carosso, N. H. V.
Davis, Leverett
Lanigan, Joseph
Uren, William J.

FLAGSTAFF

No Data Supplied
Ellis, T. John

GLENDALE

No Data Supplied
Nielsen, Alex E.

GLOBE

A. S. McClintock Company
Weaver, M. B.
Mine Supply & Hdwe. Co.
Sullivan, Wm. A.
U.S. Geological Survey
Peterson, Neil P.
No Data Supplied
Botsford, C. A.
Pearce, Milton
Williams, E. G.

GRAND CANYON

Western Gold & Uran. Inc.
Kofford, Max E.
Richards, Russell L.
Winterhalder, Erwin C.

GREER

No Data Supplied
Dentzer, Edward G.

HAYDEN

Am. Smelt & Ref. Co.
Groff, E. E.
Kennecott Copper Corp.
Allen, George J.
Bradford, Charles B.
Conwell, Cleland N.
Cox, Howard D.
Hood, John M.
Johnson, Raymond C.
Mulholland, Lyle E.
Morris, Abe F.
O'Carroll, Henry J.

Patton, John F.
Sewell, George P., Jr.
Winn, William H.
Woodruff, Frank C.

NO DATA SUPPLIED

Cooper, John A.
Downey, Frank J.
Henry, Joe A.
McAneny, Colin C.
Stockier, James E.
Vlasak, William M.
Woods, Robt. G.

HEREFORD

No Data Supplied
Wilcox, Joseph A.

HOUK

Ariz. Silica Sand Co.
Crawford, Wm. P.

HUMBOLDT

Shattuck Denn Mining Corp.
Apperson, Claude H.
Jeffers, Alba W.
Jones, Charles A.
Waples, Bee R., Jr.

INSPIRATION

Inspiration Cons. Copper Co.
Adams, Henry F.
Anderson, Thomas M.
Bamerlo, Ralph V.
Bilson, Thomas E.
Brick, Carl W.
Carne, J. L.
Cronin, John A.
Henderson, Thomas D., Jr.
Lundy, James H., Jr.
Mathewson, Donald E.
Mellus, Herbert H.
Moran, Lawrence K.
Musgrave, Paul M., Jr.
Olmstead, Hugh W.
Power, Kenneth L.
Reed, Ethbert F.
Rice, Fred D., Jr.
Schradler, William D.
Sorostokke, Harold W.
Stunz, Carl G.
Theiller, John J.
Watta, James R.
Weed, H. Carroll
Whitney, Bruce B.
No Data Supplied
Honeyman, F. D. I.
Johnson, David W.
Parker, Wesley H.

JEROME

Big Hole Mining Co.
Gemmill, Mark
No Data Supplied
Gemmill, Richard H.
Reber, Louis E., Jr.

KEARNY

No Data Supplied
Hoyt, C. Leroy
Jones, Robert M.

KINGMAN

No Data Supplied
Charles, B. E.

LOWELL

No Data Supplied
Gedge, George
Niemi, Alfred E.

MESA

No Data Supplied
McCarthy, Donald P.

MIAMI

Copper Cities Copper Co.
Napp, Gordon E.

MIAMI

International Smelt. & Ref. Co.

Coles, Henry O.
Miami Copper Co.
Bean, James J.
Coll, Benjamin R.
Fletcher, Jas. B.
Fowells, Joseph E.
Gray, John H.
Henderson, Thomas D.
Hughes, Robert P.
Simmons, W. W.
Spencer, John J.
Silver, Maxfield M.
No Data Supplied
William G. Slack, Jr.
Sloan, William F.

MORENCI

Phelps Dodge Corp.

Abell, Leo M.

Alexander, Albert L.

Armstrong, James L.

Bacon, Vance N.

Bale, Richard P.

Barr, Richard C.

Berra, Felix G.

Bonine, Norman C.

Broderick, Adrian J.

Brooks, Wesley

Campbell, John R.

Conger, William C.

Cross, Richard R.

Durek, Joseph J.

Ennis, Jerry R.

Enrico, Tony

Finton, Murrell H.

Fitzgerald, Michael J.

Green, Bennett L.

Griffith, Wm. A.

Harbison, Lawrence E.

Haxy, Ronald L.

Jacoby, Dwight Clark

Lentz, John A., Jr.

Lines, Herbert L.

Link, Pool E.

Mann, Robert E.

McFarland, J. R., Sr.

McWilliams, Thomas D.

Moolick, Richard T.

Olson, Lester D.

Orr, David H., Jr.

Riley, Chieo C.

Scheler, Aloysius M.

Sorristo, Charles A.

Stanley, Joe B.

Stock, John E.

Troll, R. C.

Tysseeling, John T.

Urband, Howard T.

Waters, Louis H.

No Data Supplied

Aker, Robert R.

Bishop, Andrew M.

Doerge, H. F., Jr.

Hughes, Martin

Linee, Billy F.

McLean, L. D.

O'Neill, G. H.

Ormsby, Lawrence

Pettibone, M.

Richards, Wm. T.

Tes, Joseph H.

Windrow, Tony M.

NACO

Cananea Consolidated Copper Co.

Ashe, Michael J.

Loving, John C.

Velasco, Jose Ruben

No Data Supplied

Fuller, Edw. P., Jr.

Ruff, A. W.

ORACLE

No Data Supplied

Nichols, Henry W.

PATAGONIA

No Data Supplied

Lenon, Robert

PHOENIX

Allis Chalmers Mfg. Co.

Kinnon, William C.

Liphardt, Louis E.

Apache Powder Co.

Kuzell, Charles R.

Arizona Dept. Mineral Resources

Flagg, Arthur L.

Knight, Frank P.

Lane, Travis P.

Smith, Lewis A.

Tuck, Frank J.

Arizona Mack Truck Sales

Fletcher, Frank X.

Arizona Small Mine Operators

Willis, Charles F.

Arizona Wholesale Supply Co.

Miller, Alden W.

Bailett Haentjens & Co.

Dodge, Ralph O.

Haentjens, Richard P.

Boyles Bros. Drilling Co.

Roberts, J. E.

Braun Chemical Co.

Whittemore, Ralph C.

B. S. & K. Mining Co.

Katz, Alvin M.

Kalaf, George

Bucyrus-Erie Company

Calland, William D.

Colorado Fuel & Iron Corp.

Helma, Luther S.

Simmons, W. W.

Spencer, John J.

Silver, Maxfield M.

No Data Supplied

William G. Slack, Jr.

Sloan, William F.

Federal Bureau of Mines

Harmon, John P.

Fisher Contr. Company

*McCullough, Douglas L.

General Electric Co.

Blair, Robert R.

Guyan, Twitty & Sievwright

Twitty, Howard A.

Harmon, Keyes & Assoc.

*Keyes, Harmon E.

Harnischfege Corp.

*Taylor, John H., Jr.

J. T. Jenkins Company

*Hyde, Harold H.

Lee Redman Equip. Company

*Mills, Robert C.

Still, Robert C.

Link Belt Co.

Bugbee, Earl H.

Minneapolis Honeywell

*Aage, Jack C.

National Equipment Co.

Hoag, Leslie F.

Peat, Marwick, Mitchell & Co.

Fagerberg, Dixon

Sheffield Div. (Armid Steel Corporation)

Moeller, J. Edwin

U.S. Bureau of Mines

Morgan, Edward A.

U.S. Forest Service

Pardee, Jack McK.

No Data Supplied

*Alienus, E. M. J.

Alexander, John L.

Beckett, P. G.

Brucker, Frederic L.

Cody, Ben H.

Conklin, Quentin E.

*Dunning, Charles H.

Engelder, Oscar G.

*Foster, George K.

Godfrey, Ralph

Isbell, R. C.

Johnsen, Eugene B.

Kidder, Courtney W.

Lichty, Lyall J.

Luke, Russell P.

McCrory, Fred J.

McFarland, Fred

Michels, E. M.

Moyer, Dari L. A.

Rice, Neil A.

Roehrer, Fred

Ruby, Robert J.

Ruggies, Guy H.

Scott, Lewis E.

Smith, Wilford D.

*Strutz, J. Jr.

Swartz, T. G.

*Tampin, William Ward

Thomas, John F.

*Tognoni, Hale Christopher

Tucker, Lee E.

Ware, John A., Jr.

Yanez, James A.

PORTAL

No Data Supplied

Troller, Theodor H.

PREScott

Still & Still Consulting

*Still, Arthur R.

*Still, Jack W.

Tarr, McComb & Ware Comm.

Ware, John Allen

No Data Supplied

Brown, Sherburne

*Gibbs, Fred

*Lintz, Mark

Tomkinson, Elmer R.

Webb, Rockwell L.

Zinkl, Andrew J.

RAY

Kenncott Copper Corp.

Ballmer, Ray W.

Bishop, Harold W.

Caviness, Clyde

Arizona-California

WEST MEMPHIS

No Data Supplied
Reed, Jack C.

CALIFORNIA

ALAMEDA

Pacific Bridge Co.
Griggs, William S.
Pacific Coast Engineering Co.
Ramden, C. D.

ALAMO

Bird Machine Co.
Burns, Thomas E.
White, William F.

ALBANY

No Data Supplied
Lutz, Kyle J.

ALHAMBRA

C. F. Braun & Co.
*Dornfeld, Morton H.
McCauley, William H.
Mineral Materials Co.
Redhead, Marvin W.
W. J. Moran Co.
Moran, William J.
The Nat'l Filter Media Co.
*Thompson, George W.
No Data Supplied
Baker, Thomas C.
Crawford, William E.
*Woodruff, Seth D.

ALLEGHANY

Original Sixteen to One Mine,
Inc.
Bennett, Clayton A.

ALTADENA

Kellogg Explor. Co.
*Kellogg, William Crowe
No Data Supplied
Laurie, Frank C.
*Toor, Frank N.
*Witter, George G., Jr.

AL TAHOE

No Data Supplied
Nazarek, Eugene A.

ALTA LOMA

No Data Supplied
Seares, Harry L.

ALTURAS

No Data Supplied
Kosa, Don R.
Nispel, Raymond C.

ANAHEIM

No Data Supplied
Knox, James Donald
Squibb, H. David

ANGELS CAMP

No Data Supplied
Allman, Lewis S.

ANTIOCH

No Data Supplied
Derrick, R. W.
Lindsay, A. Martell

ARCADIA

L. A. County Flood Control
*Dickinson, Haskell T.
Big Rock Stone & Mat. Co.
Howell, Theodore M.
No Data Supplied
Hardy, McCombs

ATHERTON

No Data Supplied
Cooper, R. J.
Woodman, W. R.

AUBURN

No Data Supplied
*Andregg, John N.
*Webster, B. F., Jr.
Sierra College
*Wilmot, Floyd T.

BAKERSFIELD

Wise Geophys. Service
*Wise, Fred G.
Kern County Land Co.
Longshore, Charles T.
Reim, Kenneth M.

SAFFORD

No Data Supplied
*Austin, Edward A.

SAHARITA

Amer. Smelting & Refining Co.

*Fall, Samuel C.
Herde, Roy S.
Lewis, P. A.
Meen, Robert B.
Owsley, Frederick D.
Sense, John J.
Sunrise Mining Co.
*Irvin, G. W.
*Nye, Thomas S.
Turney, Irvin & Assoc.
*Turney, Paul M.

SAN MANUEL

San Manuel Copper Corp.

*Actor, Leslie C.
*Ash, James L.
Bennett, Harold J.
Buchanan, John F.
Buch Ilia, Frank H.
Burke, Harry K.
Cigliano, Charles F.
Coolbaugh, Melville J.
Coxon, Vincent I.
Crenshaw, Ancel H.
Dopson, Gordon W.
Dorschel, Gerald W.
Enright, Maurice A.
*Garcia, Melton M.
Gay, Jack E.
Goodwin, James W.
Head, David D.
Hearon, Tom E.
Jacobson, Max B.
*Matthews, Gilbert J.
Murray, Joseph W.
Pelletier, John D.
*Pillar, Chas. L.
Ridinger, David C.
*Seaney, Hendrik W.
Simpson, John D., Jr.
*Snodgrass, J. Earl
Staley, E. Keith
Thomas, Lloyd A.
Tobie, R. L.
Zappia, Michael A.
No Data Supplied
Given, Edmond V.
Goss, John W.
Hall, Arthur B.
Hoagland, Frank E.
Karlstien, Ralph C.
Nilson, J.
Sablich, John W.

SCOTTSDALE

Garard-Birman Ass.
*Garard, Kenneth N.
Phillips, Hoyt & Son
*Hoyt, Philip S.
Johns-Manville
Sutton, K. Parker

SCOTTSDALE

No Data Supplied
Hughes, Robert W.
*Pennebaker, E. N.
*Robinson, Lewis M.

SILVER BELL

American Smelting & Ref. Co.

Barnes, Robert A.
*Burrill, Scott L.
Chase, Clement K.
Conger, Harry M.
Haynes, Charles W.
Jameson, D. R.
Knight, Arthur T.
Pilz, Conrad W.
*Reiner, Roman A.
Rice, Howard H.
Robinson, Ellis A.
Romney, Archie B.
No Data Supplied
McClain, Charles W.
Salter, Russell

SUPERIOR

Magna Copper Co.

*Augustadt, Garvin L.
Caldwell, Edward J.
Cooksey, Martin C.
Foraker, C. B.
Gardner, Darrell
Goss, Wesley P.
Hammer, Donald F.
Palmquist, John M.
Sell, James D.
Soule, Claude L.
Van Voorhis, Bernard
No Data Supplied
*Bowman, Jack A.
Clark, Lucius V.
Crosby, Fred

Mannheimer, L. H.
Mashaw, Robert F.
Rex, Haider J.
Sherman, Fred W., Jr.
Steele, Hubert J.

TEMPE

Arizona State Univ.
*Nutt, Merle C.

TUBA CITY

Rare Metal Corp of America
Gommel, Carl F.
Runke, Sidney M.

TUCSON

American Cyanamid Co.
McAllister, J. A.
American Exploration & Min-
ing Co.
Johnson, Fremont T.

American Metal Climax, Inc.
Casiragli, Gilbert A.
Parker, Pierce D.
Purdy, Charles P., Jr.

American Smelting & Ref. Co.

Blucher, A. G., Jr.

Courtright, James H.

Richard, Kenyon E.

Snedden, T. Alfred

Von Den Steinen, Karl A.

Warne, Ira B.

Welch, Reed F.

Anacoda Co.

*Barber, G. A.

Kelly, James L.

Banner Mining Co.

Bowman, Allan B.

Phillips, Leon W.

Venable, Boyd W.

Bob Barrett Machinery Co.

Barrett, Bob

Bear Creek Mining Co.

Bingel, James R.

Clark, Jackson L.

Eisenbrey, Edward H.

Jacobson, Herbert S.

Mahrholz, Wolfgang W.

Michel, Fred A., Jr.

*Robinson, Raymond F.

Cerro Del Bosque Corp.

Skarbek, John S.

Colorado Fuel & Iron Corp.

Klein, Estene F.

Den Baars & Roehn

*Den Baars, Dirk

Duval Sulphur & Potash Co.

Aurand, Edwin L.

Buchella, Frank H., Jr.

Curtis, Charles H.

Lewis, Ezra H.

Livingston, Richard W.

Lynch, Dean W.

Messer, Ben G.

Nelson, Donald J.

Phillips, Ira B.

Ward, Albert E.

Geological Laboratory

*Congdon, Stephen H.

Heinrichs Geexplor. Co.

*Heinrichs, Walter E., Jr.

*Mariott, John W.

Brittain-Hendrickson Mining Co.

*Brittain, Dale C.

Hoagland & Dodge Drilling Co.

*Seel, Charles P.

Kern County Land Co.

Wallace, Wayne K.

Lewisohn Copper Corp.

Chilson, Richard E.

Martin & Assoc.

*Martin, Ben H.

Min-A-Con

*Lansing, Bronson C.

Mines Exploration Co.

*Vought, Leland C.

Oil & Mineral Res.

*Barton, Joseph C.

Harlow D. Phelps

*Phelps, Harlow D.

Pima Mining Co.

Bassarear, John H.

Beebower, Arthur G.

Friedman, A. A.

Hernlund, Robert W.

*Journey, John A.

*Komadina, George A.

*Martin, Michael D.

Nicholson, Marion H.

Olk, James F.

Spaulding, E. D.

Thurmond, Robert E.

*Thorp D. Sawyer

Sawyer, Thorp D.

Southern Pacific Line

Higbie, John J.

Southwest Ventures Inc.

Stranahan, Daniel M.

State Dept. Mineral Resources

Johnson, Axel L.

M. M. Sunat Construction Co.
Hustad, Marvin A.
Univ. of Arizona
Balla, John C.
Cunningham, J. B.
Dotson, Jay C.
*Drevdahl, Elmer R.

*Fair, Charles L.

*Forrester, J. D.

Hardwick, William R.

Hewlett, Richard F.

*Krumlauf, Harry E.

Lacy, Willard C.

*Leaming, George F.

Olson, Harry J.

*Peirce, H. Wesley

*Rosevere, Geo H.

*Smith, Sigmund L.

*Titley, Spencer R.

Wilson, Eldred D.

U. S. Bureau of Mines

McKinney, William A.

Stewart, Lincoln A.

Wideman, Frank L.

Union Oil of Calif.

Luzader, James F.

No Data Supplied

Agenbroad, Larry D.

Alvstad, Henry O.

Barkell, J. H., III

*Barr, Alfred T.

Benedict, Louis P.

Bentzen, Charles M.

Pilling, John M.

Bloomfield, G. H.

*Brough, Paris V.

Brown, Henry H.

Butler, B. S.

Byrkitt, James W.

Chamberlin, Arthur E.

Chapman, Theo. G.

Closter, John J.

*Cribbs, Richard E.

Dickinson, B. G.

Dodge, Theo A.

Duff, Grover J.

Dunyon, Albert F.

Dusek, Harry N.

Eide, John J.

Evensen, Charles G.

Farabee, Joseph E.

Farnham, Lloyd L.

Fujii, Munio

Graham, Oliver B., Jr.

Hall, Arthur Curtis

Hare, Charles E.

Harvey, Norman L., Jr.

Haworth, A. H.

Head, Paul A.

Heinemann, Robert E.

Higbie, Hamilton A.

Holderness, Edward

Huckles, Daniel L. E.

*Irving, I. G.

Jackson, Guerdon E.

Jinks, Jim E.

*Johnson, John A.

Jordan, Lou D.

Keegan, Michael W.

Kinnison, John E.

Kunke, Chas. A.

Kurtz, William L.

Lamb, Kenrick L.

*Lindenau, Edward M.

*Loerpel, William H.

Mackay, Arthur G.

Maddox, George E.

Mahoney, William R.

McCabe, George P.

*McMillan, Donald T.

Menges, S. L.

Metler, Frank C.

Mitcham, Thomas W.

Morton, Erie D.

Mulchay, John B.

Newman, David F.

O'Haire, Robert T.

Owens, Sherwood B.

Parker, Jerry F.

Patten, T. M.

Ribble, George E.

*Richardson, Carl B.

Sagatelian, Ara P.

Sechrist, Stanley M.

Sense, Richard G.

Shear, Henry H.

*Spane, John L.

*Stephens, F. M.

Stone, Edwin A.

*Storms, W. Rex

*Sundness, Odin A.

Swenson, Carl R.

Tainter, S. L.

Thomas, Robert W.

Verity, Victor H.

Walden, W. W.

Waite, John W.

Walker, Bryant D.

Walker, Walter W.

Walther, Thos. N.

Wilhelm, Bruce L.

Wood, Ray C.

National Lead Co.

Benson, Orlando J.

*Bush, Arthur J.

Farrell, Edward C.

Halbert, William A.

Higgins, Albert J.

No Data Supplied

*Fond, Walter F.

Townley, W. E.

MALVERN

National Lead Co.

Benson, Orlando J.

*Bush, Arthur J.

Farrell, Edward C.

California-California

State of California
 *McDonald, James A.
 No Data Supplied
 *Manning, John C.
 Richards, Arthur J.
 Waldner, C. E.

BANNING

No Data Supplied
 Allen, Roy H.

BELVEDERE

No Data Supplied
 *Crockett, Robert E.

BENICIA

Yuba Consol. Ind., Inc.
 Carlson, Clarence G.
 Thiessen, John J.
 H. C. Macaulay Foundry Co.
 Bon Brette D.

Pruyn Construction & Engng.
 *Pruyn, John F.

Chain Belt Co.

Collins, James E.

J. R. Grizzel

*Grizzel, John R.
 Inde Mining & Milling Co.

Golson, Bernard

No Data Supplied

Berkfeld, Paul C.
 Bradley, P. R. Jr.
 Clausen, Ervin H.

Crutcher, John F.

Dickey, Robert M.

*Donaldson, Wilfrid G.
 Geisendorfer, Henry A.
 Hall, Durand A.

Holmes, William H.

*Marcellus, Roy C.

Meyer, Charles

Milward, Miles S.

Pilcher, S. M.

Shaffer, Lyle E.

Strobel, Landon F.

Thiessen, Denek J.

*Tibbets, Sydney A.

*Ward, Stanley H.

*White, Lloyd C.

Univ. of Calif.

*Fuerstenau, Douglas W.

Goldstein, Norman E.

Hawkes, H. E.

*Kiehn, Henry

*Mero, John L.

Moynihan, Jas. T., Jr.

*Ravitz, S. Frederick

Trask, Parker D.

BEVERLY HILLS

Casiano Co.

Doheny, Patrick A.

No Data Supplied

Boyd, Robert R.

*Caulfield, J. Parnell

Deavitt, William J.

Platt, James M.

Prout, John W., Jr.

BISHOP

Union Carbide Nuclear Co.

*Chamberlain, Richard E.

Martinson, John E.

*McKinney, H. L.

Sasse, L. W.

*Sullivan, John H.

Wright, Lawson A.

*Wyman, Donald J.

No Data Supplied

Kunkel, Clair M.

McGuire, Philip C.

BLYTHE

El Dorado Mine Contracting Co.

Zagar, Anton J.

No Data Supplied

Smith, Lucien W.

BORON

U. S. Borax & Chem. Co.

Hardy, James G.

Kendall, Robert E.

*Minette, James W.

Ruark, Jabe R.

Smith, Francis M.

Wamsley, Willis H.

U. S. Marines

Wamsley, Willis H.

No Data Supplied

Sawyer, Dwight L., Jr.

BRICELAND

No Data Supplied

Crerar, George

BREA

Collier Carbon & Chemical Corp.

Patchick, Paul F.

BRODERICK

No Data Supplied
 Gerling, R. W.

BURBANK

Moore Engineering Co.
 *Moore, Frank C., Jr.
 No Data Supplied
 *Smith, K. A.

BURLINGAME

No Data Supplied
 *Dakin, Frederick H.

CAMANCHE

Pacific Clay Prod. Co.
 Morledge, Fred L.

CARLSBAD

No Data Supplied
 Vail, Richard H.

CARMEL

Western Core Drill, Inc.
 Read, Vernon
 No Data Supplied
 Hoffmann, Ross B.

CARPINTERIA

No Data Supplied
 *Rohrer, S. Lewis

CASTRO VALLEY

Miller Geophysical Expl. Co.
 *Miller, M. Douglas

CHINA LAKE

U. S. Naval Ordnance Test Station
 Engel, Rene L.

CHULA VISTA

No Data Supplied
 *Lincoln, Francis C.

CLAREMONT

No Data Supplied
 Welday, Edward E.

COALINGA

No Data Supplied
 Fleisher, George G.

COLTON

Calif. Portland Cement Co.
 *Joyce, John E.
 *Smith, Ian A.
 Concrete Conduit Co.
 *VanDell, John E.

COMPTON

No Data Supplied
 Gilmore, Gerald M.

CONCORD

No Data Supplied
 Cox, Phillip W.
 Williams, Carl F.

CORNING

No Data Supplied
 *Labarthe, Warren A.

CORONA DEL MAR

No Data Supplied
 Ellis, Ernest Wm.

CORONADO

No Data Supplied
 Fitch, Walter

COSTA MESA

No Data Supplied
 Andrews, Marion Lee
 *Blickensderfer, Frank C.

COVINA

No Data Supplied
 Adamec, Lew
 Deason, William F.

CUCAMONGA

No Data Supplied
 Gonzales, Alex E.

CULVER CITY

No Data Supplied
 Atherton, H. L.

CUPERTINO

No Data Supplied
 Sampson, J. H.

DALY CITY

No Data Supplied
 Lobber, Harvey R.

DEL MAR

No Data Supplied
 Kingsard, A. R.

DIAMOND SPRINGS

Dia. Spgs. Lime Co.
 Locke, R. S.
 *Nichols, Clifford R.

DOWNEYVILLE

Best Mines Co. Inc.
 Huelsdonk, Lewis L.
 Reed, William T., Jr.

DUNSMUIR

No Data Supplied
 Ayres, Charles J.

EAGLE MOUNTAIN

Kaiser Steel Corp.
 *Brummett, Richard W.
 *Davis, Carl E.
 *Forbes, Richard C.
 Hughes, Martin J.
 Reno, Charles W.
 Savage, William W.
 Stetler, John J.
 No Data Supplied
 Urso, P. J.

EARP

No Data Supplied
 Cornejo, Luis A.

EL CENTRO

John D. Hess Test. Corp.
 *Hess, John D.

EL CERRITO

No Data Supplied
 *Matson, Edward J.

EL MONTE

No Data Supplied
 Mackay, Robert I., Jr.

EL SEGUNDO

Menardi & Co.
 *Menardi, Harold B.

EMERYVILLE

Shell Dev. Co.
 Fidiam, James F.
 Wachter, Aaron

ENCINO

No Data Supplied
 Cliveck, Blase A.

EUREKA

U. S. Forest Service
 Blodget, David P.

FAIRFAX

No Data Supplied
 Googin, Thomas M.
 *Moretti, Louis R.

FAIR OAKS

No Data Supplied
 Pantie, Walter E.

FIVE POINTS

No Data Supplied
 Gong, Chung Cho

FONTANA

Kaiser Steel Corp.
 Heers, Robert G.

FOREST HILL

No Data Supplied
 Wilson, W. E.

FORT MASON

No Data Supplied
 *Peshkoff, Viacheslav C.

FRENCH GULCH

Brown Bear Mines
 *Erich, Ezra E.
 McGuire & Henricksen
 *Henricksen, Ray M.

FRESNO

No Data Supplied
 Darden, Taylor
 Hellfrich, B.
 Rapp, Frederick A.
 Scoville, Ogden D.
 Twining, F. W.

FULLERTON

Amer. Brake Shoe Co.
 Whisler, Thomas C., Jr.
 Hughes Aircraft Co.
 Hoffman, Stanley A.

GARDENA

No Data Supplied
 Walker, William J.

GLENDALE

No Data Supplied
 Coulter, Kenneth R.
 Daniell, John, Jr.

GLENDORA

No Data Supplied
 Smith, Edward W.

GRASS VALLEY

No Data Supplied
 Brown, Earl H.
 Ferguson, Claude
 Foote, Arthur B.
 Nob, Frederick W.
 Tremoureaux, Roy C.
 Tremoureaux, Roy E.

GUERNEVILLE

Sonica Quicksilver Mines,
 Inc.
 *Reed, George F.

No Data Supplied
 Larsen, Herbert F.
 Mowry, Allen G.

HAPPY CAMP

No Data Supplied
 *Wright, Hugh

HAWTHORNE

No Data Supplied
 Northrop, Inc.
 *Allebach, Karl A.
 Bird, Thomas H.
 DiGregorio, Vincent

HEALDSBURG

No Data Supplied
 Gowing, F. A.
 Harper, John B.

HEMET

No Data Supplied
 d'Autremont, Charles M.

HERMOSA

No Data Supplied
 *Cortelyou, Arthur P.

HESPERIA

Transworld Resources Corp.
 Berry, Jacob

HILLSBORO

No Data Supplied
 Barton, Thomas V., Jr.
 Burke, Paul

HOLLYWOOD

Death Valley Talc Co.
 *Chiapella, Stephen E.
 No Data Supplied
 *Rider, Ezra B.

HORNITOS

Mount Gaines Mine
 *Siebert, J. A.

HUNTINGTON PARK

N. A. D'Arcy Co.
 *D'Arcy, Nicholas A.
 No Data Supplied
 *Campbell, A. B.
 *MacAfee, Merrill W.

IDRIA

New Idria Ming. & Chem. Co.
 Esteban, Nicholas P.
 Hurley, Frank S., Jr.
 Lewis, C. Hyde
 Linn, Robert K.
 Shaddock, Wesley L.
 Ward, Mark L.

INDEPENDENCE

Big Pine Inyo Co.
 Ives, King H.
 No Data Supplied
 Brierly, A. A.

INDIO

No Data Supplied
 Hunksker, Otto L.

IONE

Gladding-McBean & Co.
 Craven, William F.
 *Elias, J. Morrow
 *Henderson, Gerald V.
 No Data Supplied
 O'Brien, Glen T.

JAMESTOWN

No Data Supplied
 Coke, Hugh W.

KELSEYVILLE

No Data Supplied

*Field, Ross H.

KENTFIELD

No Data Supplied

Butterworth, E. M.

Maltzahn, D. W.

KENWOOD

No Data Supplied

*Goff, Ernest A., Jr.

LA CANADA

No Data Supplied
 Browning, Carleton F.

LAFAYETTE

Fibreboard Paper Products

Lightfoot, William E.

No Data Supplied

*Barnett, George I.

Gaillard, John G.

Lindsay, A. K.

Miller, Emory T.

LAGUNA BEACH

Kerr & Co.

Kerr, John L.

Grantham Mines

Franklin, Richard H.

No Data Supplied

*Clark, Alan B.

LA HABRA

No Data Supplied

Dionne, Maurice J.

MacLeod, Norman

Worthen, A. L., Jr.

LA JOLLA

No Data Supplied

Barnard, Enoch A.

Pelton, Roger T.

Peterson, Robert M.

Schmidt, Caspar A.

Stapler, James B.

Vallat, Benj. W.

LAYTONVILLE

No Data Supplied

Jung Donald

LEWISTON

Trinity Dam Contractors

*Lindquist, John T.

Trinity Dredg Co.

Smith, Mary E.

LIVERMORE

Acme Drilling Service

*Fones, Robert A.

Coast Mfg. & Supply Co.

Nelson, Fritjhof

Univ. of Calif.

*Wooster, David L.

LOMPOC

Johns Manville Prods. Co.

Schuknecht, George G.

California-California

Missile City Rock Co.	Muir, A. D.	MONTA VISTA
*Richardson, W. Neil	Nilsson, George W.	No Data Supplied
LONG BEACH	Potter, Charles C., Jr.	*Blanchard, Floyd M.
No Data Supplied	Obert, L. R.	MOUNTAIN RANCH
*Belliveau, Richard M.	Roberts, Edw. J.	CALAVERAS
Heuck, Arthur W.	Schroter, G. Austin	No Data Supplied
Kasevniak, Joseph J.	*Sill, Harley	Poore, George B., Jr.
Marquand, Bruce	Spellmeyer, S. A.	MOUNTAIN VIEW
Long Beach State College	Stein, S. E.	Hodges Chemical Co.
Chadwick, Robert A.	Sullivan, J. Thiel	Oliver, Edwin L., Jr.
Project Management Corp.	Tobelmann, Henry A.	No Data Supplied
Jenkins, William O.	Wartenweiler, Otto	Pajalich, Walter
LOS ALTOS	Wilson, George B.	NATOMA
No Data Supplied	LOS GATOS	Natomas Co.
Adelmann, C. R., Jr.	U. S. Bur. of Mines	Smith, Richard G.
Allen, Eugene S.	*Humphrey, Hiram B.	Wells, John H.
Croze, W. W. J. Jr.	No Data Supplied	NEEDLES
Dayton, Stanley H.	Bagley, Earle M.	Hampton Enterprises
Hoffman, Ralph N.	*Ferron, Robert D.	Porter, B. Frank
*Newlove, M. E.	Heikes, George C.	No Data Supplied
Ranlett, C. A., III	Kelsey, Royal W.	Cookslay, James W., Jr.
*Rodewig, George W.	O'Kelly, Wm. A.	NEVADA CITY
LOS ANGELES	LUCERNE VALLEY	Empire Star Mines Co., Ltd.
A. J. Industries	Permanente Cement Co.	Bennett, E. R.
*Tierney, Michael P.	Close, James E. H.	Espy Mining Co.
Allis-Chalmers Mfg. Co.	*Lucas, John H.	Eastman, Byron L.
*Coffey, Robert C.	LYNWOOD	No Data Supplied
Alloy Steel & Metals Co.	Western Gear	*Billick, Don Carlos
McKean, John M.	*Donaldson, Samuel N.	*Siegfried, J. F.
American Manganese Steel	MARICOPA	Simkins, William A.
Molyneaux, Norman	Berry Holding Co.	Todd, Wallace
Amer. Mineral Co.	Bush, William E.	NEWPORT BEACH
*Stewart, Blair W.	MARTINEZ	No Data Supplied
Amer. Potash & Chem. Corp.	Mountain Copper Co. Ltd.	Baily, Robert D.
Dunn, Parker S.	Vickery, H. Claude	Bell, Jerry Y.
Leonardi, M. L.	No Data Supplied	Bush, Harry E.
Weishaupl, Franklin J.	Watson, Stanley G.	MIDLAND
A. T. & S. F. Ry. Co.	MATHER	No Data Supplied
*Crutchfield, William H., Jr.	U. S. Air Force	Annes, E. C., Jr.
Calif. Div. of Mines	Herring, John C.	NIMBUS
Gray, Clifton H., Jr.	MENLO PARK	Aerojet Gen'l. Corp.
Morton, Paul K.	Aero Serv. Corp.	Friedman, Lawrence M.
Troxel, Dennis W.	Dando, Eion E.	NIPTON
Wright, Lauren A.	Amer. Smelt & Refin.	Molybdenum Corp. of Amer.
Calif. Test. Labe. Inc.	*Hershey, Lynn	*Wood, Lyle Russell
Raisells, John G.	Muesig, Siegfried	Pacific Fluorite Co. of Calif.
Chain Belt Co.	*Schenck, Roswell D.	Lineberry, S. H.
DeMott, Robert W.	Smith, Eugene D.	No Data Supplied
Charles, Ryan & Rivers, Inc.	Smith, Joe P.	Lee, Chris H.
Charles, Wm. W.	U. S. Internal Revenue	NORTH HOLLYWOOD
Chemical Mfg. Co. Inc.	Healy, Al J.	No Data Supplied
*Chase, H. Percival	O'Keefe, John J.	Gower, Harrison P.
City of Los Angeles	U. S. Lime Prod. Corp.	Peterson, Nathaniel C.
*Clark, Ronald W.	*Grindell, Lionel N.	NORTHRIDGE
Collier Carbon & Chem. Co.	U. S. Pumice Supply Co.	No Data Supplied
Wombacher, A. L.	Sheldon, P. Fay	Burdick, Sherman R.
Continental Oil Co.	U. S. Rubber Co.	NOVATO
Novotny, Stephen T.	*Tise, William R.	Wright Engrg. Assoc.
Cyprus Mines Corp.	Univ. of Calif.	*Wright, Wm. Q., Jr.
Allen, Paul W.	*Carlisle, Donald	OAKLAND
Grant, Mostyn G.	*Slichter, Louis B.	Amer. Brake Shoe
Hansen, James G.	Univ. of So. Calif.	Welch, Edward M.
Mudd, Henry T.	*Clements, Thomas	Amer. Pulley Co.
Rundle, William J.	Western Precipitation	Weishaar, G. P.
Welker, Kenneth K.	Schneider, Gilbert G.	The Colo. Fuel & Iron Corp.
Dearborn Chemical Co.	No Data Supplied	Bryant, Thomas F., Jr.
Newth, Richard C.	*Arciniega, Victor M.	Lee, David L.
Diamond Tool Research Co., Inc.	Arthur, Edward	Dorr-Oliver
Swerdloff, Eli J.	*Baldwin, John E.	Hardin, Donald C., Jr.
Dow Chemical Co.	Beaudoin, Philip F.	Meyers, John H.
Carlin, James J.	Blades, Ernest O.	*Tarr, Donald T., Jr.
*Zeuch, Clarence F.	Browning, William C.	Glen Co.
Exploradora De Minas, S. A.	Butler, Cooley	*Glenn, George G.
*Sternberg, Regis S.	Butler, Wallace P.	Henry J. Kaiser Co.
FAA	Devlin, William B.	Barneyback, Robt. S.
Potter, Parke M.	*Duke, George D.	*Conwell, James A.
Fairchild Aerial Surveys, Inc.	Eisenhauer, E., Jr.	Sulzbach, John F.
Hinrichs, F. Woods	Heberling, Wm. G.	Kaiser Alum. & Chem. Corp.
Geodynamics, Inc.	*Hoyleman, H. Wayne	Brooke, J. K.
Freeman, Gerald W.	Jamison, Robert H.	Clarke, Otis M., Jr.
*Prus, Donald E.	Johnson, Walter H.	Davis, Geo. C., Jr.
Gladding, McBean & Co.	Langley, Ralph R.	Hassan, Edward A., Jr.
Brooks, Richard F.	Larsen, Delmar H.	*Kurtz, Horace F.
*Nichols, Norman M.	Leggett, M. B.	Renzetti, Bert L.
B. F. Goodrich Ind. Prod.	McKenzie, John D.	*Shaffer, James W.
Reagan, Donald W.	Midgley, Tom, III	Tows, Donald F.
Grand Canyon Lime & Cement Co.	Lindau, S. P.	Kaiser Engrs.
*Schirm, John S.	Lord, Robert	*Bates, Ralph G.
Great Lakes Carbon Co.	Minard, Frederick H.	Blymyer, Eugene B.
Marlett, DeOits L.		
Stone, Wm. D.		
Hewitt-Robins, Inc.		
Von Migula, G.		
Holmes & Narver, Inc.		
*Graves, C. E., Jr.		
*Pack, Phillip D.		
Harnischfeger Corp.		
Pratt, Bernard M.		
Int'l. Nickel Co., Inc.		
Zima, Albert G.		
Johns-Manville		
Anklam, J. Richard		
Kennedy Minerals Co.		
Kennedy, John J.		
H. J. Kumer & Co.		
Kunier, Harry J.		
MacAfee & Co.		
*MacAfee, Donald B.		
*MacAfee, Robert D.		

California-California

Marshall, Stewart M.
Reck, Wm. H.
Smith, L. A.
Sprague, William E.
Washburn, Howard G.
Wilmot, Harry C.
Wright, Louis A.
Wynne, Gordon R.

PARADISE

No Data Supplied
*Rodriguez, Alfredo I.

PASADENA

Calif. Inst. of Tech.
*Frank, Ellis P.
*Manning, Paul D. V.
James-Vac-Lift Drilling Co.
*Holman, Joseph R.
Sierra Talc Co.
*Mulvaney, Henry
United Geophysical Co.
Blackie, Benson D.
Golding, Charles L.
No Data Supplied
Baily, Florent H.
Doerr, Albert E.
Edwards, M. G.
Holman, Marshall G.
Lindvall, Charles E.
Moran, Robt. B.
Myers, Desai B.
*Noble, James A.
*Simmons, Edward E., Jr.
*Six, Clarence W.
Tally, Robt. E., Jr.

PEBBLE BEACH

Del Monte Properties
Bein, Hugh H.
No Data Supplied
Osborne, Richard

PERMANENTE

Kaiser Alum. & Chem. Corp.
Brandt, Robert E.
Permanente Cement Co.
Connors, Edward B.
Jack, Orville E.
*Sargent, Fred R.
*Young, Ray C.

PIEDMONT

No Data Supplied
*Borden, Granville S.
Dorah, John B.
Goodrich, W. H.
Hale, Elvyn C.
*Heidenreich, W. Lee
Love, Colin L.
*Schnurmacher, G. L.
Vogt, Ernest A.

PITTSBURG

The Dow Chemical Co.
Harris, Guy H.
Long, Ray S.
Olson, Robert S.
Tveter, Elmer C.

PLACERVILLE

No Data Supplied
Pickering, Joseph

PLASTER CITY

U. S. Gypsum Co.
Fraps, Conrad L.
No Data Supplied
Marker, John L.
Shuck, Donald F.

POMONA

ConVar Co.
*Kline, James A.
Pomona Tile Mfg. Co.
*Hamner, Jordan A.
No Data Supplied
Skene, Earl
Allen, Harry P.

LA PUENTE

No Data Supplied
*Fleming, Frederick Allen

RANCHO

Minerals Beneficiation, Inc.
Rakowsky, Victor

RANCHO

No Data Supplied
*Booschen, Herman H.
Wolfard, Merl R.

RED BLUFF

No Data Supplied
*Nielsen, George W.
Valov, Igor

REDDING

Calaveras Cement Co.
Curry, James T.
Stauber, Arthur D.

REDDING

Mountain Copper Co.
McClung, C. William
Winsor, Donald K.
Walker Engrg. Corp.
Imswiller, J. Bruce
*Walker, Woodville J.
Div. of Highways
Aramayo, Luis
No Data Supplied
*Murphy, John X.

REDLANDS

No Data Supplied
Flier, Alexandra T.
*Jahn, Gustave A.
Johnson, Howard R.

REDONDO BEACH

No Data Supplied
Smith, Frank T. A.

REDWOOD CITY

Ideal Cement Co.
*Brown, Brinton C.
No Data Supplied
Cheavens, John H.
*Reikie, M. K. T.

RIALTO

No Data Supplied
*Hancock, Sam
*Nicolson, Clyde W.

RICHMOND

Advanced Instrument Corp.
*Morrison, Peter
City of Richmond
*Bynum, Charles G.
Pacific Minerals, Co. Ltd.
Renwick, Charles S.
Stauffer Chem. Co.
Mannion, Lawrence E.

RIVERSIDE

Hunter Engrg. Co.
*Gustafson, Reynold A.
Riverside Cement Co.
Buchholz, Herbert F.
Chandler, Chas. D.
Freeland, Robert E.
Jones, Cyril
Logan, Alfred H.
Nalle, Peter B.
Tuttle, Jay III
Walls, Marion B.
Weeks, LeRoy Wm.
Wightman, Randall H.
Shell Oil Distributor
*Mills, Eugene A.
No Data Supplied
McCormick, Earl L.
Szymd, Theodore M.
*Thomas, George C.
*Thorne, Thomas J.

ROLLING HILLS

No Data Supplied
*Lewis, Albert A.
Pett, Ray W.

ROSEVILLE

Electro-Nuclear Metals, Inc.
*Day, Byron S.

SACRAMENTO

Aerojet-General
*Sheppard, Ben L.
Calif. Dept. of Water Re-
sources
Dettman, Steven S.
Iwanuma, Thomas I.
Calif. Div. of Mines
Clark, William B.
State of Calif.
Foston, Dallas W.
U.S. Bureau of Land
Management
Scarfe, George O., Jr.
*Sharp, Alan A.
Zentner, Lewis S.
Calif. Div. of Hwy's.
Barclay, James M.
Klitz, Alton E.

CARTWRIGHT AERIAL SURVEYS, INC.

*Cartwright, Vern W.
Scandia Mines
*Smith, Charles R.
A. Teichert's Son, Inc.
Cole, Rordon J.
Western Boiler Engrs. Inc.
Krisher, Edward A., III
J. H. Wren & Co.
*Wren, James H.
No Data Supplied
*Ash, Simon H.
Currie, Robert A.
Fisher, Robert B.
Gilmore, Chas. L.
*Haines, Wilbur H.
Johnson, H. H.
Leatherman, R. K.
*Logan, Clarence A.
*Loomis, Frederic B.
Romberg, Miles D.
Schnaible, Dean R.
Sheffield, D. A.
Swearingen, J. D.
*Taylor, G. Cleveland

ST. HELENA

No Data Supplied
*Jackson, Thomas A.

SALINAS

Kaiser Alum. & Chem. Corp.
*Bowman, Jan
Monterey Co. Rd. Comm.
Dante, Richard E.

SAN ANDREAS

Calaveras Cement Co.
*Andersen, Edgar F.
Bagley, Earl M., Jr.
*Fuller, Willard P., Jr.
James, John W.
*Richardson, Wm. O.
No Data Supplied
Hall, Evan E.
Powell, J. C.

SAN BERNARDINO

B. D. H. Corp.
Hudson, William T.

SAN BRUNO

U.S. Navy
*Cook, Fred W.
*Konkoff, Waldemar I.
No Data Supplied
Proctor, John

SAN CARLOS

Sandvik Steel, Inc.
De Jongue, Lars A. G.
SAN CARLOS

Atlas Copco Pacific, Inc.
Averill, Kenneth M.
*Burton, Charles E.
No Data Supplied
Hilton, Charles R.

SAN CLEMENTE

No Data Supplied
*Holt, Grover J.

SAN DIEGO

San Diego State College
*Roberts, Ellis E.
*Thomas, Blakemore E.
Univ. of San Diego
*Philips, Richard P.
Am. Pac. Mineral Explora-
tion, Inc.
Hart, Wood E.
No Data Supplied
Piccini, M. J.

SAN FRANCISCO

Alimak Corp.
*Borgenhard, Jan
Allis-Chalmers
Clasen, Dana S.
Croft, Norton E.
Amer. Exploration & Min-
ing Co.
Goudrey, Hatfield
Scholz, Edgar A.
James S. Baker Co.
Baker, James S.
Bechtel Corp.
*Bjorklund, K. Geo.
*Dor, Abraham
Dungan, T. A.
*Hewitt, Robert S.
Johnson, Earl R.
*Merritt, William L.
Russell, G. Raymond
Beth. Pacific Coast Steel
Hurst, George P.

BORCHERDT & SMITH

*Smith, C. DeWitt
*Borcherd, Edward R.
Bradley & Ekstrom, Inc.
*Helmke, R. F.
Bradley Mining Co.
*Bradley, James P.
Bucyrus-Erie Co.
*Sackett, J. H.
The Bunker Hill Co.
Faston, Stanly A.
McRae, Robert J.
Calaveras Cement Co.
Duling, Orten E.
Mein, Gardner W.
Mein, William Wallace, Jr.
Metzger, Grant W.
Weeks, Orrin D.
Woodward, B. B., Jr.
Calif. Div. of Mines
Burnett, John L.
Chesterman, Charles W.
Davis, Fenlon F.
Franey, Henry J.
Franz, John C.
Gary, George L.
Oakeshott, Gordon B.
Stewart, Richard M.
VerPlanck, William E., Jr.

STATE OF CALIF.

Campbell, Ian
Smith, Emory
Chuck Boy Mine
Solar, Charles J.
Commercial Minerals Co.
Stewart, Malcolm
Cons. Purch. & Designing
Inc.
Gabriel, H. A.
Crocker-Anglo Nat'l Bank
*Abbott, Charles
Curtis & Tompkin, Ltd.
*White, George E.
Ellicot Machine Corp.
Romanowitch, Charles M.
Engrs Assoc., Inc.
*Yetter, Charles W.
Enggr. & Mfg. Journal
Huttl, John B.
Fibreboard Paper Prod. Corp.
Havard, John F.
Price, Forest W.
Gen. Elec. Co.
Rathbun, Rex B.
Gladding-McBean Co.
Wasemann, Russell K.
Goldfield, Cons. Mines Co.
*Hiale, William H.
Gordon, I. Gould & Co.
*Fopp, Silvia M.
*Gould, Gordon I.
H. W. Gould & Co.
*Gould, Malcolm B.
Abbot A. Hanks, Inc.
Irmler, Herbert D.
Quist, Martin P.
Hardinge Co., Inc.
Nolan, Charles C.
Hercules Powder Co.
*Trescher, F. George
Hewitt-Robins, Inc.
Crow, Wallis H.
Zinter, Theodore C.
Hiliconic Steamship Co.
Joffe, Gerardo
Homestake Mng. Co.
Bjorge, Guy N.
Henshaw, Paul C.
McLaughlin, Donald H.
Shoemaker, Abbott H.
Ingersoll-Rand Co.
Cherry Ned D.
Decker, Robert W.
Lang, Henry A.
Jacob Assoc.
*Jacob, J. Donovan
Walter W. Johnson Co.
*Johnson, Walter W.
Joy Mfg. Co.
Rhodes, L. C.
Kern County Land Co.
Griswold, William T.
*Moore, David L.
Arthur D. Little, Inc.
*Watson, William I.
Thomas T. Lunde, Inc.
Leroy, Alfred J.
Frank Madison Co.
Madison, Frank J.
Marcos Mining Co.
*Herkenhoff, Earl C.
Miller, James R.
Nelson, William B.
McCreary & O'Brien
*Knaus, Charles L.
The Merrill Co.
Merrill, John L.
Mine Safety Appliances Co.
Butler, Kenneth S.
Miner Engrg. & Equip. Co.
*Taylor, William F.
Monte Verda, Bernard
Mining World
*Bogert, John R.
Grundstedt, Henry G.
Edward J. Nell Co.
*Mitchell-Roberts, J. F.

NICHOLS ENGRG. & RES. CORP.

Murray, Frank J.
Nordberg Mfg. Co.
Davis, Thomas D.
*Makholm, Leonard O.
*Propst, Harold N.
Ohio Ferro-Alloys Corp.
Landon, Houston S.
Owens-Illinois Glass Co.
Heindel, Richard W.
Pacific Cement & Aggregates,
Inc.
Hampton, George F.
Howard E. L., Jr.
*Kinzie, Robt. A.
Pearson, John L.
Sanford, Lester F.
Pacific Coast Co.
*Rust, George W.
Pacific Found. & Met. Co.,
Ltd.
*Messer, Lisle R.
Sabin Engrs.
*Sabin, Alfred B.
San Luis Mining Co.
Swent, J. W.
Southern Pacific Land Co.
*Cunningham, Andrew B.
*Laird, Raymond T.
McCulloch, Wm. C.
*Papke, Keith G.
*Wright, Lawrence B.
Standard Oil Co. of Calif.
Cadle, Austin
Thurman, Charles H.
Trans. Pacific Metals, Inc.
*Price, Michael A.
Triten Engrg. Co.
*Downey, J. Ward
Trojan Powder Co.
*Smith, J. H.
U.S. Army
*Jones, David
U.S. Bureau of Mines
Davis, Lawrence E.
Dietrich, Waldemar F.
Maurer, Richard B.
Mull, Jay B.
U.S. Forest Service
Gould, Gerald E.
Johnson, William L.
Sanborn, William C.
U.S. Navy
Bonham, Paul W.
Hoskins, Earl R.
U.S. Gov.
Youtz, Ralph B.
U.S. Sec. & Exchange Comm.
Dougherty, Ellsworth Y.
U. S. Steel Corp.
Birk, Jack N.
Casburn, William J.
Cohlmeyer, Stanley H.
Hamilton, Walter A.
Harris, Fred A.
Johnson, Yard H.
*Jones, R. H. B.
*McCardle, Jack B.
Morgan, Ronald C.
Mote, Karl W.
Price, Charles F. B., Jr.
Pruden, Worrell F.
Sargis, Samson G.
Scheble, Max C.
Scott, W. Kenneth
Shirley, Eugene R.
Talbot, Robert C.
*Weier, Charles T.
Whipple, Ross W.
Utah Construction Co.
Bourret, Weston
Christensen, Allen D.
*Davis, Charles S.
Geiger, Albert F.
Goodwin, J. Grant
*Hare, Harold J.
Hunt, Rodney H.
Lancaster, Hugh K.
Littlefield, F. W.
McGraw, Charles E.
Mullen, R. L.
*Nelson, Everett F.
Riddell, Paul A.
*Shaw, Douglas M.
Terry, Richard L.
Torgerson, Earl O.
Utah International, Inc.
*Poillon, Wm. J.
Walsh Const. Co.
Schwyn, Richard B.
Western Knapp Engrg. Co.
*Andrewson, Charles H.
Arguedas, J. A.
Davidson, E. R.
*Jensen, James H.
O'Connell, Edwin J.
Western Machinery Co.
Bailey, Robert S.
Byler, Raymond
Chavez, Albert B.
Clark, Henry L.
Clayberg, Geo. A.
Damon, N. C.
*Edmunds, James E.
Felsch, Hans J.
*Fulmer, J. W.

California-Colorado

Golson, Charles E.	SAN MARINO	SHINGLE SPRINGS	VICTORVILLE	CLIMAX
Hamm, John P.	No Data Supplied	El Dorado Limestone Co.	Victorville Lime Rock Co.	Amer. Met. Climax
Hill, Jack V.	Loel, Wayne	*DeBerry, Fred G.	*Ball, Emmett B., Jr.	Achttien, Donald B.
How, Jack H.		Stinson, W. A., Jr.	*Gessner, Robert H.	Baker, Richard C.
Jarm, G. R.			Southwestern Portland Ce-	Barnett, Ralph M.
Jenkinson, Donald W.			ment Co.	Bauhan, Hobart B.
Jones, Leigh M.			Barclay, A. H., Jr.	*Corp, Ernest L.
*Kranick, Cyril R.			*MacIver, Douglas Y.	Cunningham, George G.
Mayer, Herbert J.				Distler, William F.
McNeil, Harold				Drechsler, Herbert D.
Michaely, William D.				Eisenach, Edwin J.
*Mueller, Jerry K.				*Foster, B. R.
Mulcahy, P. H.				Gott, Richard D.
Murray, Gilman Y.				Gregory, William J.
Newton, Douglas E.				*Grossman, Eugene L.
Newton, Wm. H.				Harelson, Wm. Henry
*Raring, Robert H.				Hoff, Fred J.
Regh, John L.				Hoffman, Clarence W.
*Saarinen, A. J.				Houston, Richard C.
*Samuelson, Bengt A.				Jonson, David C.
Setter, A. George				Julin, Douglas E.
Skinner, Charles F.				MacIntyre, James M.
Springton, David L.				MacKenzie, W. Bruce
Stewart, Thomas G.				Meyerton, Ralph P.
Wharton, E. Alan				Minerman, Roger L.
Wisser & Co.				Petty, John M.
*Cox, Manning W.				Powell, Bill
*Lindsey, Eugene H.				Richards, John T.
*Wiser, Edward				Smith, Albert K.
SAN FRANCISCO				*Stewart, Raymond M.
APO				Sundstrom, Marvin R.
Chandler, Albert T.				Walde, Gordon H.
Cowley, John F.				Walker, Marvin S.
Hyde, Pitt W.				Wallace, Stewart R.
McCarthy, Francis J.				Wallin, Harley W.
Mealey, George A.				Windolph, Frank J.
Newson, John H.				No Data Supplied
Pierce, Bruce				Allen, Walter B.
Tennant, R. B., Jr.				Atkinson, Edwin F.
No Data Supplied				Bender, Fred N.
*Atkinson, James E.				Burk, Snell G.
Austin, Bert C.				Cleaves, Charles A.
Berthlett, Alexander G., III				Craig, Robert
Baukol, Philip J.				Devlin, Robert
Bloom, Edward J.				Gardner, Wm. C.
Bonham, H. F., Jr.				Shore, James L.
Bowden, Robert M.				
Burgess, Robert J.				
*Byram, Herbert F.				
Cagliari, Guido E., Jr.				
Carlisle, Henry C.				
Casey, James R.				
Eddleman, W. S., Jr.				
Engel, Robert F.				
Erwin, Waldemar M.				
Franklin, R. E.				
*Frederick, Francis H.				
Gerlach, Keith H.				
Gould, Bruce A.				
Hammon, Wendell C.				
Hecht, Arthur S.				
Hughes, Arthur D.				
Jorsaleon, Ira B.				
Jorsaleon, Peter				
Laird, Thomas B.				
Levensaler, Lewis A.				
MacNichol, A. W.				
*McNeil, Clayton T.				
McShane, Oscar T.				
Mein, Wm. Wallace				
Middlebrook, John				
Morillo, Carlo S.				
Morrison, J. B.				
*Parsons, Lewis A.				
Peale, Rodgers				
Pett, L. Fern				
*Rawlings, Stuart L.				
Schaefier, Richard H.				
Short, Maynard P.				
*Smythe, Donald D.				
*Stronck, H. N.				
Tepe, Robert E.				
*Thompson, Thomas W.				
*Trueworthy, Ed. B., Jr.				
Varney, F. W.				
*Witt, Herbert Nelson				
Heald College				
*Glas, Anatol				
SAN GABRIEL				
No Data Supplied				
*Heron, Charles M.				
SAN JOSE				
Allied Geophysics				
*Rose, R. Burton				
Food Mach'y & Chem. Corp.				
*Barnwell, Lloyd R.				
Philbrook, Warren R.				
No Data Supplied				
Baquail, W. S.				
Pinecock, William A.				
Hanson, Norman E.				
*Riley, Thomas A.				
*Ternahan, James C., Jr.				
Varoy, Peter				
SAN LUIS OBISPO				
Madonna Construction Co.				
Collord, James E.				
State of Calif., Div. of High-				
ways				
Cushwa, Claude C.				
SAN MARINO				
No Data Supplied				
Loel, Wayne				
SAN MATEO				
The Elenco Corp.				
Schepman, Berne A.				
No Data Supplied				
*Benham, Jack L.				
Burmeister, L. R.				
Gunther, Donald R.				
*Joubert, Louis J.				
Kivari, Arthur M.				
*Mercier, Stanley M.				
Scheick, Edmund H.				
Stickney, Alfred W.				
Vieira, J. L.				
Whisenant, Robert N.				
SAN PEDRO				
R. J. Dalton & Sons				
*Dalton, Robert J.				
SAN RAFAEL				
Harding Assoc.				
*Cutmore, Vincent D.				
Western Exploration Co.				
*Mitchell, Miles J.				
No Data Supplied				
Dunster, C. B.				
SANTA ANA				
Orange Co. Flood Control				
*Fiske, Richard J.				
SANTA ANA				
No Data Supplied				
Ayers, A. M.				
Butler, Gurdon M.				
*Douglass, John H.				
Glahn, Reginald A.				
SANTA BARBARA				
U.S. Geol. Survey				
Miller, Glen A.				
No Data Supplied				
Hendrickson, Robert J.				
Tillis, H. J., Jr.				
Wilson, Ridgeway R.				
SANTA CLARA				
No Data Supplied				
Reithmeier, Walter				
SANTA CRUZ				
No Data Supplied				
*Brown, Walter F.				
*Foust, Barney A.				
SANTA FE SPRINGS				
No. Calif. Chem. Co., Inc.				
*King, Edwin B.				
SANTA MARIA				
Great Lakes Carbon Co.				
Reinhart, Jack W.				
No Data Supplied				
*MacMillan, Robt. S.				
SANTA MONICA				
Santa Monica City College				
*Lee, Charles A.				
No Data Supplied				
Boyd, Wallace F.				
Driscoll, Robt. Edw.				
SANTA ROSA				
No Data Supplied				
Barker, Lyle M.				
Gibson, James				
SARATOGA				
Pick Mining Co.				
Pick, Vernon J.				
*Tripp, R. Maurice				
No Data Supplied				
Barton, Thomas V.				
Hammon, Wendell P.				
SAUSALITO				
E. D. Bullard Co.				
*Bullard, Edward Wheatley				
No Data Supplied				
*Hawley, Edwin E.				
*Woodworth, Selim E.				
SEASTOPOL				
No Data Supplied				
*Schuette, Curt N.				
SELBY				
Amer. Smelt. & Refin. Co.				
Playter, George H.				
SOCIAL SPRINGS				
El Dorado Limestone Co.				
*DeBerry, Fred G.				
Stinson, W. A., Jr.				
SIERRA MADRE				
No Data Supplied				
Blanchard, Roland				
SIMI				
No Data Supplied				
Silva, Jay F.				
SONORA				
No Data Supplied				
*Lewis, Allen				
McCandlish, W. W.				
SOUTH GATE				
Fibreboard Paper Prod.				
Taylor, Glen C.				
SOUTH PASADENA				
Sierra Talc. & Clay Co., Inc.				
Booth, Otis				
Kempfer, Donald B.				
Mulryan, James D.				
No Data Supplied				
Reis, James W.				
STANFORD				
Stanford Univ.				
Garrison, Victor G., Jr.				
*Just, Evans				
*Park, Charles F., Jr.				
*Parks, George A.				
No Data Supplied				
Moore, Henry J.				
STOCKTON				
Whittaker Iron Mines				
Whittaker, Norman A.				
No Data Supplied				
Beck, E. L.				
SUTTER CREEK				
Calaveras Cement Co.				
*Slater, T. Calvert				
TARZANA				
No Data Supplied				
Weisenberg, L. E.				
TOORHANE				
Harvey Alum. Corp. of Amer.				
Loewenstein, H.				
No Data Supplied				
Lever, Harold A.				
TRABUCO CANYON				
California Non-Metallics				
*Ellerman, Otto M.				
TREASURE ISLAND				
U.S. Naval Stat. Public Works				
Dept.				
*Mrock, John W.				
TRONA				
Amer. Potash & Chem. Corp.				
Berthold, Cornelius E.				
*Otto, Merle F.				
Rockdale, Lloyd H.				
No Data Supplied				
*Darrow, Frank M.				
UNION CITY				
Amer. Forge Co.				
Coleman, Charles A.				
VALLEJO				
U.S. Navy				
*Radcliffe, Dallas L.				
No Data Supplied				
Bisio, R. P.				
VALLEY CENTER				
No Data Supplied				
*Tizard, William E.				
VENTURA				
No Data Supplied				
Martin, Robert E.				
CARBONDALE				
Mid Continent Coal &				
Coke Co.				
Reeves, John A.				
No Data Supplied				
McCann, Harvey E.				

Colorado—Colorado

Bear Creek Mining Co.
Anzman, Joseph R.
Bush, John B.
Clark, Franklin F.
Gilbert, Ray E.
Homer, Ralph C.
Rogers, George R.
Shepard, William M.
Ward, Joseph G.
Camp Bird Coal Inc.
Tremlett, Christopher P.

CS Card Works Co.
Card, David C.
J. C. Carlile Corp.
"Carlile, Jess C.
Century Geophysics Corp.
"Nicoll, Archie J.
Chicago Pneu. Tool Co.
Briggs, Orval Lon
Climax Molybdenum Co.
Norman, Teifer E.
COG Minerals Corp.
Seeton, Frank A.
State of Colorado
"Allen, Thomas
"Clark, Edward L.
Colorado Fuel & Iron Corp.
Bourne, Robert F.
Crown, Walter L.
Dowdane, Howard M.
Schmuck, Howard K., Jr.
Scott, Richard Lee
"Whitney, James E.
Wilson, Malcolm E.
Colorado Min. Assoc.
Palmer, Robert S.
Columbine Metals Inc.
"McMillan, William D.
Commercial Testing Lab.
"Masbruch, Arthur C.
Contract Engineering Co.
Goddard, Paul L.
"Hoyl, Alfred G.
Crucible Steel Co. of Amer.
Stark, Robert L.
Defense Materials Service
Winters, Verne W.
Denver Equipment Co.
Ahlborg, William T.
Daman, Arthur C.
Flagg, Richard W.
"Gisler, Henry J.
Johnson, Clyde V.
"Logue, Leland H.
"Thom, Clarence
Wick, Keith E.
Denver Fed. Center
Newcomb, Edward L.
Denver Fire Clay Co.
"Brandt, Wm. O.
E. I. du Pont de Nemours &
Co., Inc.
Campbell, Dolph
"Fowler, Eldridge M.
"Summer, Raymond H.
Todd, William E.
Watson, Fred J.
Emperius Mining Co.
Poxson, B. T.
Equipment Specialties Co.
"Davidson, Paul G.
F.M.C.
Peters, William C.
Frontier Refining Co.
"Parker, Ben H.
Gardner-Denver Co.
Alexander, Roy K.
Rapp, Arnold E.
Rieman, C. H.
General Electric Co.
"Mehl, Clinton D.
Geo. Resources Expl. Inc.
"Vickers, Rollin C.
Global Exploration Co.
"Thompson, Raymond M.
Goble & Sampson, Inc.
Smith, Guy R.
Harnischfeger Corp.
Sullivan, Ed. J.
E. K. Hartzell & Assoc.
"Hartzell, Edson K.
H. L. Hazen Inc.
"Hazen, Harold L.
Hercules Powder Co. Inc.
Persse, Franklin H.
Humphreys Engineering
Edis, Robert E.
Hubbard, Judson S.
Humpreys, I. B.
McKinley, Frank M.
Snedden, D. Henry
Welker, Merrill

Humphreys Gold Corp.
Humphreys, A. E.
Ingersoll Rand Co.
Foster, Ralph K.
Pinkerton, Dale L.
Joy Mfg. Co.
"McDowell, Glenn S.
La Plata Gold Corp.
Hopkins, John B.
F. H. Linneman Inc.
"Cooper, Earl M.
Martin Co.
Haynes, Vance

"Jones, Wm. Russell
Zimmerman, M. Jordan
McGraw-Hill Publ. Co.
Patten, John W.
The Mine & Smelter Supply
Co.
Drinkwater, Donald J.
Garbella, Elmer J.
Kautz, Harry P.
Seep, Albert E.
Shieff, Arlou E.
Thompson, Charles F.
Mines Dev. Inc.
Gray, Allen D.
Morse Bros. Machinery Co.
Cox, Buford B.
Grimes, Harold N.
Mountain States Instru.
"Spalding, Robert S.
National Fuse & Powder Co.
Hill, Arthur L.
Martin, Victor R.
Charles O. Parker & Co.
"Parker, Charles O.
Patten Eng. Co.
"Patten, Asher H.
The Ruth Co.
"Ruth, Joseph P.
Schloss & Shubart
Schloss, Charles M.
Sheiledy, Lee D.
Silver Engineering Works,
Inc.
Price, Frank B.
Stearns Roger Mfg. Co.
Asel, Philip R.
"Bernard, Frank S.
Beech, C. S.
Borasco, Leo
"Bribar, Frank E.
"Davidson, A. Jackson
Donaghue, Conrad P.
Drusa, Robert L.
Graeber, Rowland W.
McNeill, Harry L.
Olson, Ralph B.
Payne, William L., Jr.
Sprout, Arch A.
Stryker, John R.
Steel Structures
Canning, Tom V.
Summitville Consol. Mines
Inc.
"Rigg, John B.
Sun Oil Co.
Justice, P. S.
Susquehanna Engineering
"White, John B., Jr.
Susquehanna-Western, Inc.
Vogenthaler, Thomas J.
Thompson Creek Coal &
Coke Corp.
"Allan, Andrew
"Keenan, Albert M.
Tipton & Kalmbach Inc.
Duckworth, Maynard
Naylor, John
Trunk & Strauss
"Freeman, Alva O.
Union Supply Co.
Herrmann, Kenneth R.
Vanecek, Frank R.
U. S. Bureau of Reclamation
Bechtold, Charlotte A.
Wantland, Dart
U. S. Bureau of Mines
Bank, Walter
Bates, Robert C.
Boley, Charles C.
Bolmer, Robert L.
Connors, Hugh M.
Dare, W. L.
Geehan, Robert W.
Jolley, Theodore R.
"Konselman, Albert S.
Rodriguez, Ernest R.
Schapiro, Paul P.
Shaw, John F.
Shannon, Spencer, Jr.
Soule, John H.
"VanNatter, Percy C.
U. S. Foundries Inc.
"Niemeyer, Ernest L.
U. S. Geological Survey
"Boos, Margaret Fuller
Brobst, Donald A.
Canney, Frank C.
Cooper, John R.
Emerick, William L.
Frischknecht, Frank C.
Hasler, J. William
Hernon, Robert M.
Huff, Lyman C.
Keller, George V.
King, Robert U.
Lineman, Harold B.
Norton, James J.
Zablocki, Charles J.
U. S. Secur. & Exch. Comm.
Higdon, Charles E.
U. S. Treasury
Kunde, Marvin A.
Walbridge Co.
Walbridge, Cecil R.

O. W. Walvoord Inc.
"Matthews, Christian W.
"Walvoord, O. W.
Western Exploration &
Management Co.
"Board, V. L.
A. R. Wilfley & Sons Inc.
Wilfley, Arthur R.
Wilfley, George M.
No Data Supplied
Barker, C. L.
Beckman, Robert T.
Blose, Staney
Bowman, Robert
Brauns, Martin O.
"Campbell, Thomas P.
Cannaday, F. X.
"Carman, Katharine W.
"Cazier, James H.
Corbett, Francis X.
Coghill, Wm. H.
Congdon, Thomas E.
Coulter, Harold B.
Coulter, William J.
Coyle, Samuel D., Jr.
"Cramer, William B.
Daly, Thomas W.
Denny, Edward H.
"DeSollar, Tenney C.
"Dickerman, Edward D.
Douglas, Thomas B.
"East, John H., Jr.
Eisner, F. Robert
"Erickson, Roland I.
Evans, Arthur M.
Evans, J. Claire
"Fairchild, Gerard L.
"Fominyh, Michael P.
Gordon, R. W.
Grove, Clark
"Harris, George R.
Haymaker, Herbert E.
Hester, Walter B.
Hyer, J. W., Jr.
Irwin, B. H.
Kieff, J. Marvin
"Korts, Ingralaan V.
Loenshal, H. K.
"Mallery, H. W.
Mathews, Harvey
Matthews, M. O.
McMichael, H. J.
Metting, A. C.
Merritt, Robert C.
Monarchi, Jos. L.
Morgan, Helena O.
"Mosley, Herbert R.
Payne, Pearson M.
Phillips, Earl C.
"Pronmel, Harald W. C.
Quinn, James E.
Ramsay, Elmer R.
Ridland, G. Carman
Ritter, Etienne A.
Romalo, I. M.
Sanders, Eugene H.
Schipper, Warren B.
Schuster, Raymond J.
Smith, Ross W.
Stockton, John D.
Studebaker, Jas. B.
"Sweet, Arthur N.
"Tendrow, Harvey L.
Thein, Maung T.
Thomas, Lester C.
"Thomas, Sewell
"Truettell, Robert F., Jr.
Wigton, Paul L.
"Wilfley, Clifford R.
Winans, G. D.
Young, William E.
Union Carbide Nucl. Co.
Bodell, William C.
Witt, Wilmer H.
Younger, James A.

DURANGO
Mobile Oil Co.
Morrison, John A.
Telluride Iron Wks.
Ferguson, John
Vanadium Corp. of Amer.
Brinker, Fred A.
Dickerman, Edward Day
Edwards, Page L.
Viles, Dennis W.
Wm. W. Wittmeyer
"Wittmeyer, William W.
No Data Supplied
Hotter, Frank D.

EGNAR
No Data Supplied
Hankins, Terence J.
"Irvine, Gordon B.

ENGLEWOOD
Dorr Oliver Inc.
Hughart, R. P.
Gregory Jameson, Inc.
Jameson, John G.
Vulcan Iron Works Co.
Hawn, C. W.
Jett, John H.

No Data Supplied
"Dudgeon, James W.
Gustafson, Carl W.
Robinson, Ernest G.

ERIE
Imperial Coal Co.
"Gunther, Wilbur J.

EVERGREEN
Betchart-Keck
"Betchart, Arthur F.

FLORENCE

Fibreboard Paper Prod. Corp.
Comann, R. Kent

FORT CARSON

U. S. Army
Anderson, George W.

FORT COLLINS

Ideal Cement Co.
Howell, Donald H.
Wolfe, John A.
No Data Supplied
Heath, Robert C.

FRISCO

No Data Supplied
Denison, David E.

GEORGETOWN

Barodynamics Inc.
"Livingston, Clifton W.
"Waldron, Howard L.

GILMAN

N. J. Zinc Co.
Fessenden, Paul H.
Jude, William L.
Merchant, John S.
Painter, William H.
Stienmier, Harold
Wittauer, Foster J.
No Data Supplied
Brown, James M.
Williams, William B.

GLENWOOD SPRINGS

No Data Supplied
"Cross, Bertram J.

GOLDEN

Aggregates, Inc.
"Teal, George H.
Amer. Metal Climax Inc.
Cuthbertson, Robert E.
Haworth, David L.
Henderson, Robert
Jones, W. E.
Colo. School of Mines
"Ayler, Maynard F.
"Badgley, Peter C.
"Baxter, Robert A.
Bloom, Harold
"Bryner, Leonid
"Carpenter, Robert H.
Chapin, Charles E.
Crabtree, Edwin H.
Davis, Franklin T.
DeLosada, Manuel
Drobnick, James L.
"Fertig, Wendell W.
"Frost, Hildreth, Jr.
"Frush, Charles O.
"Grosvenor, Niles E.
"Johnson, Donald H.
Johnson, J. Harlan
Jones, John Moss
King, Robert S.
"Kuhn, Truman H.
Marlacher, Bert C.
Martin, Carl C.
Parkinson, Lute J.
"Smith, Fred L.
"Troft, Per F.
"Vanderwilt, John W.
"Yingat, Parke O.
"Young, Thomas R.
D. F. Coolbaugh Mining
"Coolbaugh, D. F.
Coors Porcelain Co.
"Linton, Robert E.
Wolkodoff, Vladimir E.
CSM Research Fin. Inc.

"Perry, J. Kent
Spence, Walter C.
Svendson, Paul V. H.
Kerr-McGee Oil Industries
Inc.

Henrikson, A. V.
Meyer, Gene
Chas. & Melby & Assoc.
"Melby, Charles E.

No Data Supplied
"Anderson, Thomas Patrick
"Bator, George T.
Beattie, George
"Bernstein, M. John
Burrell, Gene A.
Carpenter, Clark B.
"del Rio, Salvador M.
Downey, Joseph Mar
Gilbert, David B.
Gregg, Dean Oakley
Hopkins, Paul M.
Jacobs, Alex R.
Kaattabi, W. A.
Kylmann, W. F.
Lange, Robert B.
Mateer, W. D.
McDonough, Jay P.
Mendoza, Carlos E.
Miller, Curtis L.
Moston, Robert P.
"Parker, Ben H., Jr.
Ransom, William S.
Rother, Eberhard
"Short, Allan M.
Waisar, Richard
"Warren, S. Power
Weinig, Arthur J.

GRAND JUNCTION

Argo Mining Co.
"Campbell, Lyle F.
"Woodard, Frank E.
Beaver Mesa Ura. Inc.
Simpson, Alan M.
Balboa Min. & Dev. Co.
"Stoeck, Albert F.
Chapman & Morehouse
Mining Co.
"Chapman, John L.
"Morehouse, George E.
Climax Uranium Co.
Donnerstag, Philip
Mastrovich, Anthony M.
Toerper, Ralph C.
Wire, Paul F.

Continental Materials Corp.
Hopkins, Tad E.
Reynolds, C. H.
Roscoe, John G.
Dulaney Mining Co.

"MacPherson, Frank H.
"Powers, Philip P.
La Salle Mining Co.
Rummel, George Thomas
Lippoth & Wein Drilling Co.

"Wein, Philip S.
Minerals Engineering Co.

"Burwell, Blair
"Sullivan, Raymond G.
Mitchell Drilling Co. Inc.

N. J. Zinc Co.
Hayes, A. L.
Radabaugh, Robert E.
Shattuck Denn Mining Corp.

Newell, Thomas W.
Pacific Uranium Mines Co.
Redmond, Robert L.
S & M Supply Co., Inc.

Son, D. G.
Sprague & Henwood Inc.

Carver, Robert R.
Richards, Jacques
Superior Oil Co.

Archer, Bryan J., Jr.
Barnard, Ralph M.
Wilpolz, Ralph H.
Texas-Zinc Minerals Corp.

Bernholdt, Arthur G., Jr.
Jarvis, James D.
Redman, Travis H.

Union Carbide Nuclear Co.

Ary, T. S.
Beverly, Robert G.
Bishop, Vernon J.
Burnett, John T.
Cohan, William T.
Criswell, Wilbur F.
Emerson, John F.

Eyde, Theodore H.
Fulton, David H.
Goudge, Robert F.
Jackson, Harold K.
Kohler, W. H.
Lake, James L.
Perry, Albert J.
Pinnick, Edgar K.
Sada, Albert C.
Van Fleet, Thomas R.

Van Zante, Roy D.
U. S. Atomic Energy
Comm.

Anderson, Edwin E.
Baker, David D.
Barner, John W.

Barry, John G.
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Brown, Gordon T.

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George, D'Arcy R.
Happ, Stafford C.
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No Data Supplied
Remick, W. L.
*Sunday, William Edw.

STARKE

E. I. du Pont Co.
Ruffini, John A.

TALLAHASSEE

Coastal Petroleum Co.
*Bates, John D.
Florida State Univ.
*Bule, Bennett Frank
Florida Geol. Survey
*Vernon, Robert O.
No Data Supplied
Paine, William R.

TAMPA

S. A. Canaris Corp.
*Canaris, Svend A.
Cameron & Barkley Co.
Taylor, Don L.
Port Sutton, Inc.
*Thomas, Robert
Hewitt-Robins, Inc.
Wallace, John A.
No Data Supplied
*Fiedler, Harry L.
Goodwin, Robert C.
Horton, A. L.
Mead, Harry L.
Lowzow, Odo

VERO BEACH

No Data Supplied
*Metz, Gilbert F.

WARRINGTON

No Data Supplied
Isern, Elmer

WINTER HAVEN

Ridge Hartstone, Inc.
Fox, Harold F.
No Data Supplied
O'Neill, Frederick W.

W. HOLLYWOOD

No Data Supplied
Petrowsky, W. J.

GEORGIA

ATLANTA
Allis-Chalmers Mfg. Co.
Lacy, Chancelor E.
Dorr-Oliver, Inc.
*Bauer, Hans A.
Ulmer, Robert J.
Georgia Dept. Mines &
Geology
Peyton, Garland
Georgia Inst. of Tech.
*Husted, John E.
Upson County Mica Co.
Cronholm, Samuel P.
No Data Supplied
Fortsom, Charles W.
Geyer, Robert P.
Hume, J. N.
*Mitchell, Lane
Mitchell, Bruce L.
Johnston, I. J. W.

ATTAPULGUS

Minerals & Chem. Corp. of
Amer.
Pedler, Albert H.

AUGUSTA

Ga. Iron Works Co.
Hardy, Harvey B.
No Data Supplied
Garris, W. V.

CARTERSVILLE

Thompson, Weinman & Co.
Beavers, Willis

CHATSWORTH

Southern Talc Co.
*Glenn, M. Woodard

DECATUR

The Ga. Marble Co.
Severinghaus, Nelson

DONALSONVILLE

No Data Supplied
Kminek, John M.

DIXY BRANCH

Ga. Kaolin Co.
Fargason, David J.

ELBERTON

No Data Supplied
Coggins, Burton F.

GORDON

Southern Clays, Inc.
*Avail, Jesse H.
Scott, John W. M.

HUBER

J. M. Huber Corp.
Rogers, Jack A.
Whitehead, Don A.

LUMPKIN

No Data Supplied
Hunt, Lee M.

MACON

Burns Brick Co.
Burns, Henry K., Jr.

MARIETTA

Georgia-Florida Drilling Co.
*Willingham, Charles B.

McINTYRE

Min. & Chem. Corp. of Amer.
Todd, A. C., Jr.

SEA ISLAND

No Data Supplied
*Summers, Milo W.

TATE

Georgia Marble Co.
*Rockwell, Frank E., Jr.
Severinghaus, Nelson, Jr.
*Zibell, J. Scott

THOMASVILLE

Dawes Silica Min. Co.
Pierson, Richard E.

HAWAII

HONOLULU
No Data Supplied
Ching, Larry F.

PUUNENE MAUI TERRITORY

No Data Supplied
Simpson, Julian E.

IDAHO

ALAMEDA
No Data Supplied
Henriksen, A. J.

BANKS

Anderson Minerals Co.
Anderson, H. Ferrel

HAYVIEW

Federal Uranium Corp.
Campbell, Walter N.

HOISE

Barton, Stoddard & Milholin

*Barton, Sherwin M.

*Stoddard, Bruce W.

Talache Mines, Inc.

Burroughs, A. H., Jr.

Butler Engr. Assoc.

*Butler, Thos. C., Jr.

Intermountain Equip. Co.

Duford, Philip A.

Hermada Mining Co.

*Oberbillig, Ernest E.

Porter Bros. Corp.

*Porter, Richard B.

Idaho Mining Assoc.

Teske, A. J.

Boise Junior College

*Bikerman, Michael

No Data Supplied

Marsh, Harry W.

Moore, Wesley J.

*Wagner, Warren R.

*Whalen, Jerry F.

BONNERS FERRY

No Data Supplied
Goodrich, James P.

BOVILL

J. R. Simplot Co.

Lothrop, Robert A.

Peterson, Phillip T.

Prater, Lewis S.

CAREY

No Data Supplied

Pyran, Donald Alan

CHALLIS

No Data Supplied

Wheeler, D. P., Jr.

COBALT

Calera Min. Co.

Cole, William C.

COEUR D'ALENE

No Data Supplied

Albert, Tom

*Brownson, Lloyd D.

*McDougall, Stanley W.

Garber, Claude Y.

Langston, A. E.

*Radford, Norman A.

Zeigler, W. L.

EMMETT

No Data Supplied

Martin, John W.

GOLDEN

Center Star Min.

Lynch, Harold C.

GROFINO

No Data Supplied

Chamberlain, C. C.

HAYDEN LAKE

No Data Supplied

*Hundhausen, Robert J.

IDAHO FALLS

Phillips Petro Co.

*Godfrey, Garvin H.

G. E. Co.

Mann, Robert C.

KELLOGG

KELLOGG

Marr Lease

*Redding, Curtis F.

Bunker Hill Co.

*Baker, Douglas

*Bethune, Angus Y.

*Bracken, E. O.

Cote, Ralph W.

Drewry, Don W.

Gordon, Joe E.

Griffith, Levern M.

Hammerand, Veral F.

Hathorn, Charles C.

Horsman, J. Raymond

Kirkpatrick, Kenneth K.

*Klobusicky, Tibor

McConnel, Roger H.

*Mize, Robert J.

Muhs, Robert A.

Nugent, Alfred E.

*Olds, Edward B.

Park, M. Austin

Prindle, Fred L.

*Rudy, Joseph F.

*Sather, Norman J.

*Tapper, Thomas M.

Sidney Min. Co.

Brown, Malcolm C.

*McKinley, Chas. A.

Sunshine Min. Co.

*Colson, James B.

Copeland, James B.

*Dumham, James C.

Johnson, H. Bradley

McKinnis, William B.

*Sharp, Franklin H.

Tiffany, James C.

No Data Supplied

Bell, Lauren L.

Jasberg, O. J.

Mahoney, Ben F.

McCulloch, G. J.

Preston, K. L.

Routon, Donald E.

Russell, Robt. L.

Scanlon, Robert H.

KINGSTON

No Data Supplied

Butler, John N., Jr.

MC CALL

Cal-Creek Placer, Inc.

Evans, Mark

MONTPELIER

*Hand, David

Bausch, Robert K.

Wilson, Francis L.

Sacriston, C. Robert

No Data Supplied

Gaynor, Thomas E.

MOSCOW

No Data Supplied

*Cook, E. F.

*Fahrenwald, Arthur W.

Hollenbaugh, K. M.

Newton, Joseph

*Staley, W. W.

*Whiting, Jerry M.

*Williams, Robert S.

MOUNTAIN HOME

No Data Supplied

Mashburn, L. F.

*Rausch, Paul E.

OSBURN

No Data Supplied

Rice, Robt. A.

Woodard, William R.

PLACERVILLE

No Data Supplied

Prebble, Bert

POCATELLO

J. R. Simplot Co.

Clouser, John F.

Kilbourne, W. Grant

Pothier, O. Edward

Food Mach. & Chem. Corp.

Fowler, Heath B.

Hayden, Russell J.

Heim, George W.

Howard, Richard I.

Lowry, John W.

Martin, George Wm.

Power, Otto Alfred

Rooney, Fred S.

Vincent, Kenneth C.

Willey, Stephen F.

Young, W. Arthur

No Data Supplied

Hill, Robert B.

*Scardino, James J.

ST. MARIES

No Data Supplied
Schwarze, David M.
Walker, Pierce C.

SALMON

No Data Supplied
Oref, Wallace R.

SILVERTON

No Data Supplied
Vianes, U.

SODA SPRINGS

Monsanto Chem. Co.
Atwood, George L.

No Data Supplied
Crouse, Russell H.

Gardner, Sherman D.

TROY

A. P. Green Fire Brick Co.
of Idaho
Buchan, Michael A.

WALLACE

Hecla Min. Co.
Anderson, William, Jr.

Bell, J. Douglas

*Craig, John G.

Crandall, Wallace E.

Davis, Robert B.

*Droste, Keith J.

Edwin, Charles H.

Kirkeberg, Knute, Jr.

Love, William H.

*Rice, Gary R.

Simos, John G.

Sorenson, Arthur H.

*Sorenson, Robert E.

Day Mines, Inc.

Day, Henry L.

*Crosby, Garth M.

Farmin, Rollin

*Sparks, Carville E.

Amer. Smelt. & Refin Co.

Deshler, George A.

Dorman, K. Robert

Kieffer, Joseph C.

Gordon, Robert Glenn

Haeseler, Albert E.

Kesten, S. Norman

Meicher, Milton A.

Illinois-Illinois**BENTON**

Old Ben Coal Corp.
MacDonald, J. W.
No Data Supplied
Garwood, Thomas L.

BERWYN

No Data Supplied
Hurt, George, Jr.

CAIRO

No Data Supplied
Sullivan, Dan A., Jr.

CANTON

No Data Supplied
Gaber, Andrew J.
Schickedanz, L. H.

CARBONDALE

Southern Illinois Univ.
*Amos, Dewey H.

CAVE-IN-ROCK

Minerva Oil Co.
Musson, George H.

CENTRALIA

No Data Supplied
Carl, James D.

CHICAGO

Allen & Garcia Co.
*Boyett, Clyde C.
*Cuthbert, William R.
*Dowlin, Donald H.
*Fitzgerald, R. H.
*Garcia, John A.
*Von Meding, Wm. A.

Allis Chalmers Mfg. Co.
Snarr, James W.

Schaub, Henry W.
American Brake Shoe Co.
Morel, George H.
Ward, Giltry

Armour Industrial Chemical Co.

*Baarson, Robert E.
*Corley, Hoyt M.
Parks, John R.
Bell & Zoller Coal Co.
Rasmussen, Roswell C.

A. J. Boynton & Co.
*Boynton, Arthur Jefferson
Eberlein, John B.

Calumet & Hecla Inc.

Bassett, H. Y.

Lovell, Endicott R.

Chem. Met. Corp.

Kremm, G. F.

Climax Molybdenum Co.

Goth, John W.

Commercial Test & Engr.

*Langtry, Wilmer D.

Dorr-Oliver Inc.

Porter, Ed. F.

Dunn Coal & Oil Co.

Edwards, Phillip J.

Engineering & Mng. Jnl.

Chase, Charles H.

Freeman Coal Mining Corp.

Williamson, Harry Jr.

Mauk, H. Eugene

*Isenberg, Nathan

Harrington, George B.

Gen. Amer. Trans. Corp.

*Gutzeit, Gregoire

Lyons, Emerson J.

Seery, Frank E.

Goodman Mfg. Co.

*Byers, William E.

Caine, Kenneth E.

Cunningham, Morris F.

Ferguson, Wm. T.

Goodman, Howard

Goodman, William E.

*Long, Norman W.

Newton, John S.

Steerley, John J.

Whiton, Ronald W.

Great Lakes Carbon Corp.

*Triska, Alfred A.

Hannemann's, Inc.

Schats, Warner S.

Horn & Green Co.

Green, Joe G.

Industrial Enterprises Inc.

Orsburn, James T.

Inland Steel Co.

Graff, Howard M.

Hunter, Lemuel B.

Johnson, Hjalmar W.

Olson, Lemoyne S.

International Harvester Co.

Bercher, Harry O.

Lindgren, Roy A.

Jet Oli Co.

Green, T. Howard

Victor H. Jones Co.

Adams, Robert A.

Kaiser Engineers
Hyatt, W.
*Milliken, Clinton L.
Knott & Meilly, Inc.
Anderson, Charles S.
Linde Co.

Calaman, Joseph J.
Link-Belt Co.
Davidson, David E.
Gerler, Warren C.
Linton, Thomas
Millard, Laurence O.
Ralph J. Lofquist Co.

*Lofquist, Ralph J.
Long-Airdox Company
Hennessey, William R.
Manley, Paul C.
Sims, C. Binford

Maclean-Hunter Publ. Co.
*Lenhart, Walter B.
Lindsay, George C.
Meschter, Elwood, Jr.
Marquette Cement Mfg. Co.
Solbrig Charles V.

John F. Meissner Engrs. Inc.
*Larson, Bennett C.
Meissner, John F.
Williams, Nolan H.

Midcontinent Coal and Coke Co.
*Wood, Leighton S.

Mid-West Coal Producers' Inst., Inc.
Tobey, Julian E., Jr.

Miller & Co.
Briggs, H. Kenneth
Morton Salt Co.
Pyle, George R.

Old Bee Coal Corp.
Campbell, William C.
PAR Associates
*Robbins, F. Peter

Raymond Patterson
*Patterson, Raymond
Pit and Quarry Publications
Trauffer, Walter E.

Portland Cement Assn.
Bates, A. Allan
Process Development Co.
Ritsch, Howard P.

Productive Equipment Corp.
*Lehman, Lewis H.
Chicago & N.W. RR Company
*Huedepohl, E. Bradley

Rock Island RR Co.
*Sibley, Milton W.
Roberts & Schaefer Co.

*Chen, Wen-Lan
*Dawson, Raymond E.
*McCulloch, William C.
Miller, Richard G., Jr.
Wender, James D., Jr.

Sahara Coal Co.
Herder, Howard A.
Soil Testing Services, Inc.
*Dahl, Doring C.

Traylor Engineering & Mfg. Co.
*Weddle, Jesse Lawrence

Truxa-Traer Coal Co.
Dress, Laning
Livingston, H. C.

Shumate, Mack H.
Tibbs, Harry M.

United Electric Coal Co.
Huey, John J.
Kolbe, Frank F.
Uttarback, Gene H.

U. S. Gypsum Co.
Appleyard, Frank C.
*Hammer, Edward J.

U. S. Rubber Co.
*Runvik, Richard C.
Knoblock, Richard F.

U. S. Steel Corp.
Gruenberg, Asher S.

Victor Chemical Works
(Div. of Stauffer Chem. Co.)
*Derick, Clarence G.

Wedron Silica Co.
Gawthrop, Alfred
Paul Weir Co., Inc.

*Ball, Clayton G.
Bellows, George D.

*Chapman, George H.
Gammeter, Erwin
Good, John E.

*Hall, Robert B.
*Kachik, David J.
Stolser, Lee R.

*Weir, John P.

*Weir, Paul

Western Electric Co.

Scott, J. Walter

Western Knapp Engrg. Co.

*Martschinke, William C.

O'Brien, Daniel E.

Western Precipitation Div.

Joy Mfg. Co.

Scherr, Eugene F.

Wisconsin Steel Works

Wheatley, Roy P.

M. A. Young & Co.

*Fiterman, Morian E.

No Data Supplied
Allen, J. M.
Alport, Hamilton
Anthonisen, Robt. P.
Block, Philip D., Jr.

*Bryant, A. D.
Cain, Hollis B.
Crown, Irving
Destry, Donald M. J.
Dodds, Robert A.

Eberle, Herman R.
Fletcher, J. H.
Gregg, Theodore R.
Hayden, C. T.
Hernandez, C. N.

Heydecker, H. Roland
Holmes, Albert W.
Holt, John L.
Jacobs, C. B.

Johnson, Roy A.
Karpinski, R. W.
Latimer, Thomas H.
Middlekauff, R. J.

*Rockwood, Nathan C.
Saybe, Paul L.
Slomer, Joseph J.
Sutherland, R. L.

*Treadwell, A. Harry
Tripp, Fred B.
Vines, H. J.
*Wagner, Herman A.

Woods, Henry C.
Young, Robert K.
Zaborowski, Robert

CHICAGO HEIGHTS

No Data Supplied
Hillmer, Roy W.

CHRISTOPHER

No Data Supplied
Moroni, Eugene T.

CICERO

Ind. Filter & Pump Mfg. Co.

*Zievers, James F.

COAL CITY

No Data Supplied
McKee, M. A.

DANVILLE

Securities Dealer
*Butcher, Fred E.

DEERFIELD

No Data Supplied
Arend, Carl A., Jr.

Hearn, Jane K.

DES PLAINES

No Data Supplied
*Brown, Levi S.

DIXON

III. State Highway Dept.

*Kustka, Joseph R.

Larsen, Wallace L.

No Data Supplied
Sunay, Neddet H.

DOWNTON GROVE

John L. DuMond Co.

*DuMond, John L.

DU QUOIN

No Data Supplied
Albon, Dean E.

EAST ALTON

Olin Matheson Chem. Corp.

Hamilton, Norl

*Shepard, Ralph Edward

EAST PEORIA

No Data Supplied
Hansen, Robert C.

Radomsky, John

EAST ST. LOUIS

Alcoa

Bell, Gordon M.

Aluminum Co. of America

Basler, Wayne G.

American Zinc Co. of Ill.

Brown, Oren P.

Burgess, J. Wesley

C. K. Williams & Co.

Stewart, T. J.

No Data Supplied
Reed, Merele J.

ELDORADO

Minerva Oil Co.

Montgomery, Robt. Gill

*Rule, William T.

Spees, Durward C.

ELGIN**ELGIN**

III. Div. Hgwy.
Manderfield, Charles Y.
State Highway Dept.
Safak, Husamettin

ELIZABETH TOWN

Minerva Oil Co.

*Daly, J. J.

*Saxby, Donald B.

*Wood, John A.

No Data Supplied
Anderson, O. E.

Hamal, Miles

ELMHURST

No Data Supplied
Biddulph, Robert L.
Culhane, Frank R.

ELSAH

Principia College

Gore, Dorothy J.

EVANSTON

Northwestern Univ.
Dapples, Edward C., Jr.

No Data Supplied
Dickson, Robert B.

Kelley, Joseph A.

EUREKA

No Data Supplied
Reesman, Richard H.

FIATT

Truxa-Traer Coal Co.

Luxner, James V.

FOX RIVER GROVE

No Data Supplied
Wilson, Robert W.

GALENA

The Eagle-Picher Co.

Arndt, William E.

Haffner, Robert L.

Haman, Harold H.

Willowa Engrg. Co.

Miles, Edwin H.

GALESBURG

Bixby-Zimmer Engrg. Co.

Rose, Colin G.

No Data Supplied
Bixby, K. R.

GLENCOE

No Data Supplied
*Young, William P.

GLENVIEW

No Data Supplied
Nordberg, Broor

Fritz, John L.

No Data Supplied
Sutherland, R. G.

PARK RIDGE

Glos & Ast. *Glos, Edmond A., II*

PEORIA

Caterpillar Tractor Co. *Haley, Wilbur A.*

McLeod, Gordon B. *Kress Engineering*

*Philippi, Laurel B. *No Data Supplied*

Clay, Richard T. *Leong, Judson*

Squires, Robert L. *Boynont, Donald R.*

QUINCY

Gardner-Denver Co. *Fishback, Niel M.*

Ganz, Robert H. *Gardner, John W.*

Kuykendall, James E. **Ringel, James E.*

Vaughan, Everett E. *No Data Supplied*

Boynont, Donald R. *Boynont, Donald R.*

RIVERSIDE

No Data Supplied *Edgerton, B. P.*

Listak, John *Boynont, Donald R.*

ROCK ISLAND

Amer. Zinc Co. of Ill. *Wampler, Harold R.*

Bituminous Casualty Corp. **Herbert, Charles F.*

Illinois-Kentucky

ROSCICLARE	BLOOMINGTON	MEDARYVILLE	VINTON	BENHAM
Aleco Bousman, Samuel G. Shaw, Chester W.	Indiana Univ. "Lowell, Wayne R. Mead, Judson Patton, John B. Wier, Charles E.	No Data Supplied Rosenberg, Louis	No Data Supplied Eskilson, Emil E.	Intl. Harvester Co. Irwin, Clyde H. No Data Supplied
Aluminum Co. of America "Harrison, William H., Jr. "Skeels, Walter S. "Wrobel, Fred C.	No Data Supplied Ozark Mahoning Co. Balle, Harold E. Brecke, Ervin A.	MICHIGAN CITY	KANSAS	BEREA
Rosiclare Lead & Fluorspar Mfg. Co.	Rand, Helmo Winter, W. B.	Joy Mfg. Co. Lee, Arnott J. No Data Supplied Connelly, Thos. J.	ABILENE	Berea College "Smith, Riley S., Jr.
Blechisen, Jacob	BRUCEVILLE	MUNCIE	BAXTER SPRINGS	BIGGS
No Data Supplied Cunningham, W. D.	Enoco Collieries Inc. Conrad, Heber A. "Stachura, John A.	Indiana Steel & Wire Co. Inc. Holmes, Alvin W.	Weidman Indust Inc. Weidman, Hubert G., Sr. "Weidman, Thomas H.	Feds Creek Coal Co. Inc. Venable, Robert V.
SCALES MOUND	CRANE	MUNSTER	WILMINGTON	CORBIN
No Data Supplied Collin, Stanley B.	U. S., NAD Johnson, Edwin H.	No Data Supplied Ziehl, Othon A.	No Data Supplied "Clarke, Sim S. "Kline, Duane M. "Schaefer, George R. Stroup, R. J. "Stroup, Robert K. Vaught, Earl J. Weidman, H. G., Jr.	U. S. Steel Corp. Hamlet, A. E. Witt, Robert, Jr.
SKOKIE	EAST CHICAGO	NEWBORGH	CHANUTE	DRIFT
American Colloid Co. Bechtner, Paul Johnson, John D.	General American Transp. Corp. "Metheny, Donald E. White, Earle Alexander	Alum. Co. of Amer. Yeager, George G.	No Data Supplied "Hurt, E. P.	Turner Elkhorn Min. Co. Reed, B. F.
Intnati. Minerals & Chem. Corp.	EAST CHICAGO	NEW MARKET	COFFEYVILLE	DRAKESBORO
Blazovic, Phil, Jr. Dunbeck, Norman J. Fulghum, Weldon F. Kruger, Frederick C. Lane, Bruce M. LeBaron, I. Milton Loehr, H. Turner Mataich, Peter F. "Mitterer, Adolph V. "Reuss, John L. Reut, Lawrence A. "Siger, Morton I. Ware, Thomas M. White, Nelson C.	Inland Steel Co. Girard, Lucien Kyriakides, Steve K. Maretta, Joseph T. "Matthews, William H. Maulkin, William R. U. S. Gypsum Co. Sieh, Clayton J.	No Data Supplied Yount, Don A.	No Data Supplied "Wigton, George H.	P&M Coal Mining Co. Miner, Jas. A. Sorrell, Sherwood W.
Portland Cement Assoc. Clausen, Carl F. Hunter, Frank R. Porter, Edward S. Tonry, J. Richard	ELBERTFIELD	OAKLAND CITY	HUMBOLDT	HARLAN
No Data Supplied Buettnier, Melvin A. Clawson, Floyd J. Tucker, Robert G. Ware, Louis	Ingle Coal Corp. Ingle, David	The Enos Coal Min. Co. Mullins, Richard A.	Monarch Cement Co. Runnels, Russell T.	HAZARD
SPRINGFIELD	EVANSVILLE	RICHMOND	HUMBOLT	ECKERT, A. R.
No Data Supplied Fox, James M. Jess, John Agee Spankis, R. F.	Dow Chemical Co. Luehring, George E. No Data Supplied Greves, John H.	No Data Supplied Grayer, George D.	No Data Supplied Fegely, H. V.	JENKINS
STEELVILLE	FORT WAYNE	SHOALS	HUTCHINSON	BETH MINES CORP.
No Data Supplied Bridges, Raymond H.	Belden Amador Mines Inc. Banks, Leon M. The Deister Concentrator Co. Bliss, Roderick T. Griffin, Donald N. Mancini, Peter V. Tiernon, Carlos H.	U. S. Gypsum Co. Brown, Thomas R. Wynn, Leonard E.	The Carey Salt Co. "Stone, Ronald B.	Dittrick, Alden C. Manwarine, Lewis G., Jr. Prunty, Marshall E. Stevens, David W. Storey, Richard W. Wilson, James C.
ROBINSON	GARY	SOUTH BEND	KANOPOLIS	LEXINGTON
No Data Supplied "Zwermann, Carl H.	J. J. Grady Co. Inc. Grady, John J. U. S. Steel Corp. Lee, Edward J. U. S. S.—Universal Atlas Cement Div. Ludwig, Norman C. Rader, Herbert L. University Club Cavanaugh, John P.	Curtiss-Wright Corp. "Marsh, Wm. J.	Independent Salt Co. Hunt, Duane M.	James M. Daniel & Assoc. "Daniel, James M. J. Stephen Watkins Co. "Egan, Byron N. Univ. of Kentucky "Roll, Williams H. "Spokes, Ernest M.
TAYLORVILLE	INDIANA HARBOR	SULLIVAN	LAWRENCE	LOUISVILLE
Peabody Coal Co. Cooksey, Joel N., Jr.	Inland Steel Co. "Sheets, Cleo B.	No Data Supplied Hannum, Arnold M.	Univ. of Kansas Edwards, George H. "Gillerman, Elliott King, Ralph H. Kulstad, Robert "Smithmeyer, Frederick C.	Anacoda Alum. Co. Lewis, Mord No Data Supplied Carter, Carroll S. Blankenship, D. K. Egan, Howard N. Merritt, Jack A. Moran, Archie E. Uccardi, Frank J.
URBANA	INDIANAPOLIS	TERRE HAUTE	PITTSBURG	LYNCH
III. State Geol. Survey "Bradbury, James C. "Cady, Gilbert H. Frye, John C. "Harrison, John A. "Helfinstine, Roy J. Jackman, Harold Wesley Lamar, John E. Risser, Hubert E. Simon, Jack A. University of Illinois "Chesney, Wm. R. "Eadie, George R. White, George W. "Wright, Fred D. "Wuerker, Rudolph G.	Allison Div. of GMC "Caple, William G. Ayrshire Collieries Hightower, Thomas R. Merle, James J. Swallow, Richard H. Heat & Power "Reese, John P. High Line Rock Co. Inc. "King, Addison H. P. R. Mailory & Co. Moore, Charles H. Sigurdson, Harold Morgan Coal Co. Spears, Miller E. Pickards Mather & Co. Tuttle, Max A. Stonefort Corp. Dukes, William W. "Sherwood, Samuel F. Clyde E. Williams & Assoc. Hillery, Charles M. No data supplied Hitchcock, Charles K.	Atlas Powder Co. Bennhacker, Gilbert A. The Maumee Collieries Co. Lee, Hugh B. Mine Safety Appliance Hodgson, C. H. Reich Mfg. Co. Inc. Reich, Wendell L. Snow Hill Coal Co. Gossard, Amzi G. Templeton-Matthews Corp. Matthews, Max A. No Data Supplied Stewart, Lafe	McNally Pittsburg Mfg. Corp. "McNally, Thomas "Mellon, Myron W. "Woodhead, Robert C. Pittsburg & Midway Coal Citron, Elmer Henry "Phelps, Edwin R. No Data Supplied Lewis, Frank E. Spencer, W. C.	U. S. Steel Corp. Burg, Stoddard S. Gibson, William E. Johnston, Kenneth A. Johnson, Thomas E. Keeler, W. W., Jr. Kodrowsky, William G. Radomsky, George Schroder, John L., Jr. Scrugham, Hal M. Stewart, James R.
WESTERN SPRINGS	INDIANA HARBOR	VINCENNES	PRAIRIE VILLAGE	MADISONVILLE
No Data Supplied Eckrote, Ken R.	Enoco Collieries Inc. Yancik, James R. No Data Supplied Hansen, M. V.	Conair-Astronautics Div. Gen. Dynamics Corp. Harvey, Alfred S. No Data Supplied Huebner, G. Robert	WICHITA	Colonial Coal Min. Co. "Donan, John G. Paul M. Jones & Assoc. "Jones, Paul M. West Kentucky Coal Co. Inc. Knight, Herman E. Patterson, Guy M.
WHEATON	INDIANAPOLIS	WABASH	TOPEKA	MARION
No Data Supplied Burrows, John P.	U. S. Gypsum Co. House, Robert M.	U. S. Treasury Dept. Rube, Karl Univ. of Wichita "Berg, J. Robert	Boeing Airplane Co. McIntosh, Roy T. U. S. Treasury Dept. Rube, Karl Univ. of Wichita "Berg, J. Robert	Mico M&M Co. "Shoemaker, Jay C. Penn Salt Chemicals Corp. "Tibbs, John S. West, La Mont Kentucky Fluorspar Co. No Data Supplied
WINNETKA	WARSAW	AMES	KENTUCKY	
No Data Supplied Bell, John H. Irwin, David D.	Amer Brattice Cloth Marshall, Lawrence K.	Iowa State College "Gwynne, Charles S. "Lemish, John	ASHLAND	
INDIANA	KANKAKEE	COUNCIL BLUFFS	ASHLAND	
BEDFORD	General Mills Inc. Terry, David E.	Griffin Wheel Co. Marold, Frank	Armco Steel Corp. Todd, George H.	
Ingalls Stone Co. Ingalls, Robert, Sr.	LEBANON	FORT DODGE	BARBOURVILLE	
No Data Supplied Hoadley, John A.	No Data Supplied	U. S. Gypsum "Longus, Ronald H.	U. S. Bureau of Mines Parry, George W.	

Kentucky-Massachusetts

PAINTSVILLE

South-East Coal Co.
"La Viers, Harry

PIKEVILLE

Batten & Batten
"Batten, D. S.
Big Sandy Elkorn Co.
Moogrove, J. H.

PRESTONBURG

Beaver Creek Cons. Coal
Corbin, Carl H.
Prestonburg Engrg. Co.
"Reed, Charles Alan

SECO

South East Coal Co.
Allison, Blucher F.

STEARNS

"Hodge, Rex

STONE

Ford Motor Co.
Apple, Foster L.
Eastern Coal Corp.
Price, Vance

WAYLAND

Evans Elkhorn Coal Co. Inc.
Evans, George E., Jr.
Howard, Noah Daniel

WHEELWRIGHT

Inland Steel Co.
Gibson, Raymond W., Jr.
Grimm, Bobby M.
Jones, Donald E.
Lockin, George W.
Pace, E. Minor
Roberts, Elford H., Jr.
Salisbury, Fred H.
Zimmerman, H. O.
No Data Supplied
McKee, D. W.
Cole, Perry W.
Yarberry, Arthur H.
Halbert, Charles D.
Harris, Ollie E., Jr.
Sewell, Henry S.
Zegeer, David A.
Emrath, P. C.

LOUISIANA

AVERY ISLAND

Int. Salt Co.
Johnson, Erland
No Data Supplied
Terrell, E. P., Jr.

BATON ROUGE

Kaiser Alum. & Chem. Co.
Phillips, Keller A.
Sparkman, James E.
Louisiana State Univ.
"Cordiner, James B.
Howard C. Edward
Sandberg, Adolph E.

BATON ROUGE

Felder, Joseph G.
Jones, Robert L.
Knight, Kenneth M.

FORT BELVIOR

No Data Supplied
Greenwood, Henry V.

GRAMERCY

Kaiser Alum. & Chem. Corp
Dalton, Benjamin S.
Johnson, Walter B.

LAFAYETTE

Koulocheris, A. I.

NATCHITOCHES

Northwestern State Coll.
"Noel, James A.

NEW IBERIA

Phipps Drill Bit Co.
"Phipps, Orville
No Data Supplied
Kieffer, Alonzo R., III

NEW ORLEANS

Freepoort Sulphur Co.
Axelrad, B. A.
Flint, Delos E.

Feierabend, Raymond H.
Johnston, Robert H.
Lee, Clarence O.
La Luz Mines, Ltd.
Molina, Eduardo
Plecas, John
Nat'l Lead Co.
Middleton, David M.
Shell Oil Co.
Keys, George W.
No Data Supplied
McCarter, W. B., Jr.
Colvocoreses, A. P.

PORT NICKEL

Freeport Nickel Co.
Beyer, Arthur J.

PORT SULPHUR

Freeport Sulphur Co.
Bailey, John H., Jr.
Gustafson, Arnold A.
Monroe, J. E. Jr.

RUSTON

La. Polytechnic Inst.
"Aiken, Rhea M., Jr.

SHREVEPORT

William M. Barret, Inc.
"Barret, William M.
No Data Supplied
Brown, Frank E.
Forgotson, James M.
"Stevens, R. George

WEEKS

Morton Salt Co.
West, Wayne

MAINE

AUBURN

No Data Supplied
Cummings, John S.

AUGUSTA

John R. Rano Inc.
"Rand, John R.

BANGOR

No Data Supplied
Bridge, Burrill A.

BLUE HILL

Potash Co. of America
"Coope, G. F.

FORT WILLIAMS

Krumlauf, Harry E., Jr.

OLD TOWN

James W. Sewell Co.
"Wing, Lawrence A.

ORONO

University of Maine
Howd, Frank H.

YORK

No Data Supplied
Trafton, Burke O.

MARYLAND

ADELPHI

No Data Supplied
Davitt, William H.
Iverson, H. G.
Army Chemical Center
Jones, Stuart M., Jr.
Smith, Robert J.

BALTIMORE

Baltimore Health Dept.
"Sayers, Royd R.
Baltimore & Ohio R. R. Co.
"Kerr, Eugene J.
Shrode, R. S.
Davidson Chemical Co.
Harris, John M.
Dept. Geol. Mines & Water
Resources
Singewald, Joseph T., Jr.
Ellicot Mach. Corp.
Von Bolhar, Edgar J.
Enoch Pratt Free Library
Hart, Eugene
Kenncott Refining Corp.
Galbiati, Donald V.

No Data Supplied
Dix, G. P.

BETHESDA

No Data Supplied
Parker, Glen L.
"Tyler, Paul M.
Upchurch, Thos. B.

BRANDYWINE

No Data Supplied
Laughlin, Alex Wm.

CHEVERLY

No Data Supplied
Franklin, R. K.

CHEVY CHASE

French Mining Mission
Car, Maurice A.
No Data Supplied
Corgan, Joseph A.
Hughes, H. Herbert
"Maury, Jesse L.
O'Neill, Leo J.
Sloman, Harold J.

COLLEGE PARK

U.S. Bureau of Mines
Babcock, Clarence O.
Eilertsen, Nils A.
Frasier, Foster
Lamb, Frank D.
Obert, Leonard
Panek, Louis A.
Shelton, John E.
Stock, John A.
Swanson, Vernon F.
Univ. of Maryland
"Schroeder, Wilburn C.

EDGEWATER

No Data Supplied
Griggs, C. C.

FROSTBURG

No Data Supplied
Hartig, Philip, Jr.

GERMANTOWN

Atomic Energy Comm.
Gardner, Conrad I.
Kennedy, Richard H.

HAGERSTOWN

No Data Supplied
Carlevato, Harold G.

HILLCREST HGTS

No Data Supplied
Lepley, L. K.

HYATTSVILLE

No Data Supplied
Gottley, Sidney
"Ralston, Oliver C.

KENSINGTON

Perma-Rock Prod.
"Richards, Owen
No Data Supplied
Allsman, Paul L.

MURKIRK

No Data Supplied
Otis, LeRoy M.

OAKLAND

Peters Fuel Corp.
Peters, Franklin W.

ROCKVILLE

No Data Supplied
Flynn, George J., Jr.

SILVER SPRING

Johns Hopkins Univ.
Heuring, Francis T.
U.S. Geol. Survey
Robertson, Eugene C.
No Data Supplied
Kennedy, Donald O.
"Knouse, Frederick L.
Wilnot, Richard C.

SPARROWS POINT

Bethlehem Steel
Keeney, James F.

TOWSON

No Data Supplied
"Brown, John S.

WEST HYATTSVILLE

No Data Supplied
Anderson, Sumner M.

WHITE MARSH

United Clay Mines Corp.
Breza, Michael

MASSACHUSETTS

ADAMS

No Data Supplied
Voelker, Mervin J.

AMESBURY

Callahan Mining Corp.
Mahoney, Rolland F.

AMHERST

Amherst College
"Bain, George W.

AUBURNDALE

No Data Supplied
"Paddison, Louis F.
"Woods, Basil Kirkland

BELMONT

No Data Supplied
Gilman, George H.

BOSTON

Bacon Constr. Co. Inc.
"Walch, Mark J.
Wm. H. Coburn & Co.
"Coburn, William H.

COPPER RANGE CO.

Boyd, James
Goodwin, David M.
Eastern Gas & Fuel Assoc.
Granger, Graham
Harvard Univ.
Madero, Antonio
Keweenaw Land Assoc. Ltd.
Taylor, Carroll C.

UNITED FRUIT CO.

Lusk, J. Marshall
U. S. Steelting, Ref. &
Min. Co.
Graves, W. H., Jr.
Metcalfe, John B.
Mulock, Fred S.

NO DATA SUPPLIED

Duriez, Leo H.
Everts, Robert B.
Fayweather, J.
Jackson, Danforth
Shaw, Quincy Adams
Talbot, Harold L.

CAMBRIDGE

Harvard Univ.
"Anderson, James A.
Bell, Peter M.
Desseau, Gabor
Grauer, John Darrell
"Kojan, Eugene
"McKinstry, H. E.
"Navias, Robert A.
"Schoon, Robert
"Smith, Calvert

ARTHUR D. Little, Inc.

"Flood, H. W.
"Gibbons, Donald R.
"Glaser, Paul W.
"McAllister, Robert W.
Almeida, A., Robert

Mass. Inst. of Tech.

"Agar, Gordon E.
"Chwastik, Stephen
"de Bruyn, Philip L.
Foster, F. Leroy
"Gaudin, Antoine M.
"Hurley, Patrick M.
"Parks, Roland D.
Wilson, Carroll L.

NO DATA SUPPLIED

Burns, William
"Gibson, Russell

CANTON

Emerson & Cuming, Inc.
"Lefurge, John W.
Chestnut Hill
"Skehan, James W.

LENOX

Stokes Properties Inc.
Stokes, Wm. E. D., Jr.

LEXINGTON

No Data Supplied
"Gurley, Robert C.

LYNN

No Data Supplied
Oberson, Henry J., Jr.

MARBLEHEAD

No Data Supplied
"Breymann, John B., III

MATTAPAN

No Data Supplied
Pechet, M. S.

NANTUCKET

No Data Supplied
Crichton, Edward B.

NATICK

No Data Supplied
Garbesi, V. A.

NEWTON

*Ladoo, Raymond B.

NEWTONVILLE

Jarrell-Ash Co.
"Jarrell, Oscar W.

QUINCY

Eastern Engng Sales Co.
Smith, Jas. LeRoy

READING

No Data Supplied
Owens, Robert L.

SO. HADLEY FALLS

Galemore, W. A.

SOUTH WALPOLE

Bird Machine Co.
"Gills, J. J.
"Northcott, Elliott
Shepherd, Henry H.

SPRINGFIELD

Zimmermann, R. A.

WABAN

No Data Supplied
Moore, Carl F.

WALTHAM

U.S. Air Force
Brewer, Howland S.

WATERTOWN

No Data Supplied
Devereux, Owen F.

WELLESLEY HILLS

No Data Supplied
"Douglas, C. B. E.
McGeorge, Robert M.

WEST CHELMSFORD

H. E. Fletcher Co.
"Fletcher, Ralph A.
Fletcher, R. A., Jr.
Mould, Channing B.

WESTFORD

No Data Supplied
Fletcher, E. K.

WILMINGTON

AVCO Res. & Adv. Dev.

Arcoleo, Thomas F.

WINCHESTER

No Data Supplied
Newton, Roger H.

WORCESTER

Norton Co.
Clarke, Robert G.

YARMOUTH

No Data Supplied
Emerson, Leon W.

MICHIGAN

ALABASTER

U. S. Gypsum Co.
Van Ornum, Maynard H.

ALMONT

Core Labs. Inc.
*Wells, Richard B.

ADA

No Data Supplied
Castle, Robert H.

ANN ARBOR

Univ. of Mich.
Boyer, William H.
*Clore, Paul L.
*Heinrich, E. William
Johnson, Alvin C., Jr.
Kraus, Edward H.
*Landes, Kenneth K.
Perhas, Ralph M.
*Turneau, Frederick S.
*Williams, G. Brymer
York, J. Louis

BENTON HARBOR

Alloys Inc.
Hurd, Paul S.
No Data Supplied
Barnes, Parry

BESSEMER

Pickards Mather Co.
Helge, Ellis C.

BIRMINGHAM

No Data Supplied
Spencer, Andrew R.

CALUMET

Calumet & Hecla, Inc.
*Benedict, C. Harry
Boorman, Alfred C., Jr.
*Dashine, Paul
*Kuchta, Ernest M.
Landstrom, Arnold B.
*Lasio, John
Pierce, Robert L.
Pollock, James E.
Schillinger, Alvin W.
Vitton, John J.
Weege, Randall J.
No Data Supplied
*Broderick, Thomas M.
Campbell, Colin A.
*Wohlrab, Aloys H.

CASPIAN

Pickards Mather & Co.
Bailey, Carlton D.
*Martini, Arthur A.

CRYSTAL FALLS

Inland Steel Co.
*Ahl, Wayne J.
Republic Steel Corp.
Thaler, Julio H.
No Data Supplied
Hagglund, Walter E.
*Pardee, Franklin G.
Reed, W. P.

DEARBORN

Ford Motor Co.
Bodor, Robert L.
No Data Supplied
Read, Leo E.
Tyler, W. W.

DETROIT

Drummond Dolomite Inc.
Gabel, Gerald R.

Detroit Public Library
Uliefing, Ralph A.
Fargo Mach. & Tool Co.
*Haworth, Ray D.
Hindman Corp.
Michelson, John A.
Int'l Salt Co.
Bertram, Bruce M.
Jacoby, Charles H.
Ryon, John L., Jr.
U.S. Army

Leonard, Donald J.
U. S. Steel Co.
Campbell, Lloyd S.
Ferguson, Herman W.

Wheel Trueing Tool Co.
Pickard, Albert F.
No Data Supplied
Adamson, Patrick
Heron, S. D.
Scott, Gerald R.

EAST LANSING

Michigan State Univ.
Cummings, David
Vehrs, Robert A.
*Zinn, Justin

EAST TAWAS

No Data Supplied
McGee, Leamon G.

GALESBURG

No Data Supplied
Becker, D. Dallas

GRAND RAPIDS

AMI, Inc.
Haddock, John W.
Bestwall Gypsum Co.
*Sager, Ronald L., Jr.
No Data Supplied
Keeler, William S.

GROSSE POINTE

No Data Supplied
Greiner, Pete
Hoover, Walter M.

HANCOCK

No Data Supplied
*Keck, Walter E.
Reeder, J. Harry

HAZEL PARK

Jered Ind.
Foreman, Charles G.

HIGHLAND PARK

Chrysler Corp.
Margenau, Roy E., Jr.

HOUGHTON

Mich. College of Mining & Tech.
*Adler, Lawrence
*Bacon, Loyola O.
*Been, Walfrid
*Bossard, Gerald W.
*Doane, Virginia L.
*Frantti, Gordon E.
Harry, Chas. M.
*Hockings, William A.
*Kennedy, Allen D.
*Kerekes, Frank
*Neilson, James M.
*Nigro, John C.
*Parker, Jack
*Snelgrove, Alfred K.
*Spiroff, Kiril
Stuart, Robert L.
Thayer, Duane M.
*Van Pelt, John R., Jr.
*Vollin, Meiden E.
No Data Supplied
Barr, T. R.
Fisher, James
Masterson, N. H.
*Riddell, J. Murray
Schreier, Thos. F.
Schubert, Geo. P.
Toionen, Frank J.

IRON MOUNTAIN

Ford Motor Co.
Kral, Victor E.
Keenan, Emile B.
Trettheway, Ben C.
M. A. Hanna Co.
Geist, Eldon W.
Lee, Floyd H.
Petersen, Charles E.
*Smith, Richard R.
Sougstad, Edw. Eldon
Lake Shore, Inc.
Greenly, John R.
Jamar, John W.
Reeve, Byron W.
W. B. Thompson Co.
Thompson, Wallace B.
No Data Supplied
Berg, W. B.
Hecker, Thomas C.
Sullivan, Paul G.

IRON RIVER

Dewald Engineering
*Dewald, Walter E.
M. A. Hanna Co.
Clemens, James W.
Kochier, George A.
Kuehlthau, Kurt R.

McAuliffe, John D.
Remarcke, George R.
Zimmer, Paul W.
Inland Steel Co.
*Edwards, Robert W.
Neshitt, Robert H.
*Tweed, Thomas M.
Mineral Mining Co.
Brown, Fayette E.
The Miners State Bank
Kreski, Edward J.
Odgers Drilling, Inc.
Nelson, Marlowe A.
*Odgers, Ira D.
No Data Supplied
Neil, Harris A.
Peterson, Richard W.

IRONWOOD

Mautha Mining Co.
*Cigallio, A. J.
*McDonald, Kenneth A.
Sharrer, John L.
Pickards Mather & Co.
Petersen, Roy I.
Prestle, Leslie E.
Wangard, John C.
No Data Supplied
Johnson, A. L.
Knoll, Waldemar A.
Shaughency, H. C.
Walker, Neal E.

ISHPEMING

Cleveland-Cliffs Iron Co.
Anderson, Gerald J.
Anderson, D. Palmer
Berkhahn, Robert W.
*Campbell, D. Kelly
*Derby, Edwin L., Jr.
Erick, Louis J.
Erickson, Lee
Hakala, Oliva W.
Johnson, Edwin B.
Kaupilla, T. A.
Koski, Roy A.
LaBeille, R. John
Leach, Hugh J.
Lindroos, Emerit W.
Magnuson, Ralph E., Jr.
Margiana, Onnie
Meyers, James P.
*Randolph, E. Richard
Sundeen, Stanley C.
Swanson, Harry C.
*Winslow, Kenel C.
Hercules Powder Co.
Adams, John W.
Inland Steel Co.
Broderick, Alan T.
Brown, Douglas E.
Johnson, Robert E.
Johnson, Wesley G.
Lacke, Robert J.
Olson, John M.
Olson, Frederick A.
Pearson, Philip D.
Satterley, Raymond D.
U. S. S. Co.
Byers, Richard R.
No Data Supplied
Annear, Richard C.
Archibald, Robert
Crites, Joseph D.
Jackson, George R.
Lemay, Donald B.
Marin, Martin J.
Metzger, Verne E.
Peterson, Harry S.
Rex, Eric J.
Villar, J. W.

KALAMAZOO

No Data Supplied
Ames, Howard E.
Garske, David H.

KINGSFORD

No Data Supplied
Hall, Roger

LAKE LINDEN

No Data Supplied
Tregoning, Richard A.

LANSING

No Data Supplied
Smith, Richard A.

LAURIUM

No Data Supplied
Ogara, Henry W., Jr.
Pouli, Robert K.
Spencer, R. Robbins

MADISON HEIGHTS

No Data Supplied
Boston, Richard R.

MARQUETTE

No Data Supplied
Clark, James W.
Klumb, Ronald G.
McKichan, John D.

MIDLAND

Dow Chemical Co.
Anderson, Raymond J.
Cardwell, Paul H.
*Gould, Wayne D.
Kuchinic, Robert M.
McCarty, Merrill F.
Peterson, Richard W.

Kaiser Aluminum & Chem.
Corp.

Stephens, Robert W.

MT. PLEASANT

No Data Supplied
*Brown, William F.

NEGAUNEE

Burridge-Nyland Equip. Co.
Burridge, Charles K.
Jones & Laughlin Steel Corp.
*Avery, John W.
Balconi, Russell L.
*Benson, Wm. A.
Brauno, Robert W.
Karkkainen, C. W.
Purdy, Clifford J.

Mich. Min. & Marble Co.

*Korpinen, Hugo H.
North Range Mining Co.
*Archibald, Ralph S.
*Haller, Francis J.
No Data Supplied
*Barrett, Leslie P.
Boyum, B. H.
Schausten, John W.

NORWAY

No Data Supplied
Giuliani, Gerald R.

PLYMOUTH

Evans Products Co.
Bedford, John P.

POWERS

Wisconsin Ind. Truck Co.
Johnson, Emmett G.

RIVER ROUGE

U. S. Gypsum Co.
Kebel, Harlan L.

ROGERS CITY

U. S. Steel Corp
Baker, Ralph L.
Ransom, William R., Jr.
Suliot, J. N.

SAINT LOUIS

Mich. Chem. Corp.
Laczynski, Edward M.
Marvin, Theo.
Whitman, Judson H.

SAULT STE. MARIE

Mich. College of Mining & Tech.
*Kemp, C. Ernest
No Data Supplied
Roe, Ray Lyle, Jr.
Ver Deaux, C. G.

SOUTHFIELD

No Data Supplied
Putnam, W. P.

TRENTON

No Data Supplied
Castner, Thomas J.

WAKEFIELD

Pickards Mather & Co.
Fountain, William G.
Hodge, Rodney D.
Wakefield Iron Co.
Ziolkowski, Edward F.

WHITE CLOUD

No Data Supplied
Maranz, David E.

WHITE PINE

Copper Range Co.
*Ohio, Ernest L.
White Pine Copper Co.
Elizondo, Joseph B.
Gamble, Ross E.
Garfield, Lawrence A.

No Data Supplied

*Kangas, Adam W.

Michigan-Minnesota

Lessels, Virgil L.
Lukkarila, Walt Q.
Nicholls, William F.
Ramakrishnarao,
Gundimeda S.
Taipale, James M.
Trainor, Michael P.
No Data Supplied
Mukavitz, David R.

WYANDOTTE

No Data Supplied
*Piper, Thomas B.

MINNESOTA

AURORA

Bear Creek Min. Co.
Mancuso, James D.

BABBITT

Reserve Min. Co.
Banovetz, Matthew R.
*Bertie, Raymond J.
McIntire, Fayette E.
Moyer, Allan M.
*Pastika, Joseph, Jr.
Woodie, Merlin G.

BIWABIK

Pioneer Min. Co.
*Bergstrom, Frank S.

BUHL

No Data Supplied
Baker, John J.
Betzler, Wm. F.

CALUMET

Jones & Laughlin Steel Corp.
*Abercrombie, Russell L.
Ellerton, Geo. A.
Gross, Joseph R.
No Data Supplied
Lemke, Laverne

CHISHOLM

Sherman Mine Oliver Mining Div.
Forsmark, M. J.
Snyder Min. Co.
Axelson, Oliver A.
Barker, Ted J.
*Coen, Kenneth P.
Ekar, Rudolph A.
Erikila, Mauri E.
Hoag, Max C.
*Jensen, Frederick T.
No Data Supplied
Crescenzo, Peter J.
Grant, Charles H.
Richards, William F.

COLD SPRING

Cold Spring Granite Co.
Alexander, John C.

COLERAINE

The Cleveland-Cliffs Iron Co.
Pearson, Ronald B.
Oliver Iron Mining Inc.
Aholia, Vernon V.
Batties, Leon E.
Belobradich, William J.
*Derby, Richard A.
Fowler, Alan
Harrison, J. H.
MacAlpine, Kenneth F.
Olson, Reuben L.
Palusky, Eugene
Sciploni, Louis
*Unger, Harold F.
No Data Supplied
*Matson, Amel E.

COOK

No Data Supplied
*Maki, John O.

COOLEY

M. A. Hanna Min. Co.
Faust, Herbert H.

CROSBY

M. A. Hanna Co.
Engel, Fred K.
*Hunner, Guy B.
Trost, Lawrence C.
Pickards Mather & Co.
Stetson, Harland J.
Pittsburgh Pacific Co.
Bardsheath, George T.
Halstead, M. Richard, Jr.
No Data Supplied
*Kangas, Adam W.

Minnesota-Minnesota

Simmons, John J., Jr.
Van Evera, James Wilbur

DEERWOOD

No Data Supplied
Chilton, Dan R.

DULUTH

Robert M. Adams Co.
Adams, Robert M., Jr.
American Steel & Wire Div.
U. S. S.
Moore, LeRoy W.
Atkins-Walker Co.
*Walker, Harry C.
The Congdon Office Corp.
Congdon, Robert
Eisco Corp.
*Grimes, Mark Dean
Lien, Russell A.
The Higgins Office
Higgin, Raymond J.
Joy Mfg. Co.
Lundmark, Robert J.
MacCallum, Arthur A.
Link-Belt Co.
Morrison, John E.
Mesabi Mineral Assoc.
Pearl, William G.
Minneapolis-Honeywell Reg. Co.

Bierman, Roy J.
W. S. Moore Co.
Everett, Jack V.
Moore, Warren S.
Simon, Robert E.
Smith, Lawrence E.
Werner, Robert F.
Nordberg Mfg. Co.
Crandall, John W.
North Western-Hanna
*Crawford, John T.
Oglebay Norton Co.
*Torreano, August F.
Oliver Iron Mining Div.
U. S. Steel

Andreaschi, John R.
Axelson, A. H.
Bennett, Robert L.
Beukema, Christian F.
Bradley, Stuart V.
Burton, Carlyle R.
Connolly, Lewis P.
Duhling, W. H., Jr.
Erickson, William T.
Ersperer, E. G.
Ferris, John A.
Freeman, Donald B.
Friedman, Edwin A.
Hustad, James B.
Iverson, Cedric L.
Johnson, Everett Dan
Johnson, Thys B.
*Knutson, Arnold R.
Learnmont, Robert P.
Lopez, Roger
Matheson, William N.
Maki, Richard R.
Mareden, Ralph W.
*Meyers, Henry F.
*Paiasvirta, Ossi E.
*Rathbun, Grove A., Jr.
Reid, Ian L.
Salmi, Robert W.
*Savage, Alfred F.
Segar, Raymond W.
Spencer, George H., Jr.
Steel, James S.
Stone, Elmer G.
Strong, Richard
Taylor, James L.
Pickands Mather & Co.
Anundsen, Erling A.
Beard, Richard C.
Chisholm, Alex D.
Chisholm, Donald M.
DeVaney, Fred D.
Joppa, Everett L.
Royce, Josiah
Stunkard, Bruce W.
Republic Steel Corp.
Cash, E. H.
Snyder Min. Co.
Rudstrom, Chas. O.
U. S. Bureau of Mines
Look, Allen D.
U. S. Steel Corp.
Bailey, Charles N.
*Williams, Milton F.
Zeller, George C.
H. E. Westmoreland Inc.
*France, Alfred E.
Zenith Iron Min. Co.
Sellwood, Joseph G.
No Data Supplied
Adams, Robt. M.
Alworth, Royal D., Jr.
Anderson, Ernest J.
Antonell, M. R.
Brewer, Carl
Brewer, Richard
Cotter, Wm. E., Jr.
*Diehl, G. E.
Dudley, Harry C.
Duncan, Kenneth

Durfee, George A.
Hakala, Harvey J.
Harkins, Wesley R.
Hunnes, Earl E.
McEachin, John L.
Morton, Ronald J.
Moyle, Robert M.
Nelson, Albert O.
Peterson, Andrew Y.
*Roberts, Hugh M.
Schnaufer, A. E.
*Scofield, Lloyd M.
Thielman, T. C.
Werther, F. R.
*Wolff, J. Frederic, Sr.
Young, Frank A.

ELY

Bolitho Engineering Office
*Bolitho, Edward C.
Oliver Mining Div.
U. S. S.
Berkner, Donald A.
Dick, Leslie E.

EVELETH

Eveleth Fee Office
*Campbell, Vernon R.

FINLAND

No Data Supplied
Machamer, Jerome E.

GRAND RAPIDS

J. & L. Steel Corp.
Hake, Francis D.
No Data Supplied
Althouse, John G.
Simon, James A.
Stewart, William G.

HIBBING

The Cleveland-Cliffs Iron Co.
Bell, Orin R.
Hill, Arnold E.
Continental Sales & Equip. Co.
*Scott, Donald W.
Eveleth Fee Office
Munter, Vanner J.
Great Northern Iron Ore Properties

Baehr, Richard E.
Robins, William A.
Lehtola, Evert M.
Watson, William W.

The M. A. Hanna Co.

Andreaschi, B. M.
Beckman, Charles A.
Buck, Robert O.
Bunge, Fred E.
Dyson, Fred E., Jr.
*Erickson, Stephen E.
Koski, Eino O.
Koskinen, Peter K.
Kotonias, George J.
Lipovetz, Gerald J.
Martinson, Ronald M.
Matsila, George A.
Meit, C. James
Morrow, James B.
Wallace, Robert C.
Warhol, Warren N.

Hardinge Co. Inc.

Ferguson, E. C.
Hewitt-Robins Inc.
*Willard, Paul D.
Jasper Enr. & Eq. Co.

Jamar, Dwight W.
Jones & Laughlin Steel Corp.

*Harker, Richard T.
*Linden, John F.
*Strande, Julius A.

Lerch Bros. Inc.

Lerch, Glen B.

Mahoning Ore & Steel Co.
Greenaway, Nicholas J., Jr.

Abe W. Mathews Engrs. Co.

Banke, Joseph J.
Frendewey, James O.
Gribble, Robert Q.
*Mathews, Abe W.

Meriden Iron Co.

Bennett, Joseph C.

*Stuart, James R.

*Torreano, Peter F.

Mesaba Services & Supply Co.

*Barber, Max Hayden

*Taylor, W. L.

Mesabi Mineral Assoc.

Mayer, Christian J.

Minn. Div. Lands & Min.

Cicchi, David P.

W. S. Moore Co.

Reese, Hiram E.

Oliver Iron Mining Div.

U. S. S.

Anderson, Roger G.

Bailey, Carlton D., Jr.

Beebe, Wayne W.

Bratt, John M.

Hansen, Lloyd B.

Hearing, John H., Jr.

Johnson, Marvin E.
*Pell, George H.
Sermon, Milton R.
Skorseth, Robert A.
Van Delinder, M. D.
Wallace, Robert R.
Waller, Paul R.
Pacific Isle Min. Co.
*Boentje, John D., Jr.
*Harrison, Hugh H.
Hart, Henry M., Jr.
Kimball, Donald C.
Vellella, Anthony T.
Pickands Mather & Co.
Carlson, Gordon N.
Childs, Mary-Hill
Merklin, Kenneth E.
Nyhus, John W.
Peterson, Edward C.
Rhude & Fryberger
Fryberger, Wm. B.
Rhude, Jens O.
U. S. Steel Corp.
*Koenen, A. T.
Western-Knapp Engrg. Co.
*Archambault, James J.
*Hario, Neil
Heilman, Joseph C.
*Johnson, Robert N.
WEMCO DIV.

Western Machinery Co.

*Coffield, Gordon E.
McKnight, Donald E.

The Zeco Co.

Sheeschik, David R.

No Data Supplied

Aronson, C. W.

Barrett, F. C.

Bassett, R. H.

Calvin, C. J.

Clevenstine, R. I.

Giumac, George

Hanson, Lauren K.

Holland, Norman G.

Madsen, J. M.

Madson, Dick L.

McElvain, R. E.

*Pickering, Hayden M.

Rhude, James E.

Richards, B. S., Jr.

Rockwell, S. A.

Ryan, Kenneth H.

Sheppard, John J.

Sulikonen, John A.

Swenington, N. C.

Vik, R. A.

Webb, Wm. D.

*Wolff, Werner P.

Young, F. A.

HOYT LAKES

Eric Min. Co.

Ahquist, H. Richard

Basso, John A.

Bell, Robert W.

Berge, O. T.

Brebner, Elliot J.

Bymark, John V.

Carlson, Arnold J.

Daughney, Vernon F.

Farrell, Robert H.

*Groll, Kenneth R.

Healy, John H.

Hockin, E. Bruce

Hovland, Mark L.

Johnston, Leonard E.

*Marinelli, George M.

McDermott, William F.

Poore, John G.

Stensund, Roscoe

Thaler, Albert B.

Tittman, David W.

Tuttle, Wayne H.

Williams, Charles J.

Wivell, James W.

Pickands Mather & Co.

Brown, P. Hamilton

*Whaley, Henry F.

No Data Supplied

Johnson, Raymond E.

Sears, Hayden F.

Zontelli Bros. Inc.

Blanch, Steve R.

Zontelli, Emil A.

IRONTON

No Data Supplied

Noble, Duane H.

KEEWATIN

M. A. Hanna Co.

*Whitney, Richard W., Jr.

Pickands Mather & Co.

Maxwell, Ellis C.

MARBLE

Cleveland Cliffs Iron Co.

*Hutchings, Louis E.

No Data Supplied

Bolton, Hubert F.

Viant, H. L. Roy

MAZEPPA

No Data Supplied

Searles, John N.

MINNEAPOLIS

Archer-Daniels-Midland

Lenz, Thomas H.

Bear Creek Min. Co.

Bailey, Paul A.

Millet, Frank B., Jr.

Bennett Office Inc.

Bennett, Russell H.

Ingersoll-Rand

Robinson, A. W.

Thomassen, Mark W.

Al Johnson Const. Co.

Anderson, Neil L.

Lindgren & Lehmann

*Lehmann, Ernest K.

Link Belt Co.

Lovrien, James K.

Lithium Corp. of America

Clarke, Fremont F.

Harris, Carleton B.

E. Longyear Co.

Burnhart, Vincent N.

*Davidson, Donald M.

*Donovan, Percy W.

Eastman, Walter R.

*Gebhardt, R. C.

Giesen, Michael J.

Hansen, Mayer G.

Kurtze, Harry A.

Laramie, Eugene E.

Longyear, Robert D.

*Nelson, Arthur M.

Richmond, Stewart G.

Sorensen, Bryan F.

Tucker, Edwin G.

R. L. Loofbourou, P. E.

Manganese Chem. Corp.

Babbitt, Bernard R.

Meriden Iron Co.

Ferris, Wallace F.

Kampmeyer, John J.

Montana-Dakota Utilities Co.

Smith, Cecil W.

The Pillsbury Co.

Graca, Rezzoe

U. S. Bureau of Mines

Colombo, Arthur F.

Fine, Morris F.

Grosh, Wesley A.

Marovelli, Robert N.

Needham, Albert B.

Rand, Lenox H.

Rushton, Tom N.

Univ. of Minnesota

Bleibfuss, Rodney L.

Cooke, S. R. B.

Delzer, Francis X.

Gundersen, James Novotny

McCravy, Roe J.

Noite, J. M.

*Pfeifer, Eugene P.

Schulz, Norman F.

*Schwartz, George M.

Wade, Henry H.

*Weston, George F., Jr.

*Wodzicki, Antoni

*Yardley, Donald H.

Warrenland Co.

Gaarden, Alice R. Warren

Winston Inc.

Jackstrom, John H.

*Gal, Charles P.

No Data Supplied

*Adams, Salisbury

Bennett, Theo. W.

Calhoun, Allan B.

*Gervis, Therese G.

Miller, Jack R.

Schultz, Clifford W.

Snyder, John H.

Sorenson, Roy T.

Wasson, Paul A.

MONTICELLO

No Data Supplied

Comstock, E. H.

MT. IRON

Oliver Iron Mining Div. of

U. S. Steel Corp.

Forcies, James E.

NASHWAUK

Cleveland-Cliffs Iron Co.

*LeClair, William M.

M. A. Hanna Co.

Dicks, Mason L.

Englund, Arthur E.

Kowes, John R.

Kauti, Eino A.

Krapf, Vaclav R.

Nelson, Donald K.

Oss, Donald G.

Owen, John S.

Wick, Dave E.

No Data Supplied

Larson, Harry A.

OSSEO

Carwell Engr. Co.

*Schneider, Darrell F.

PENGILLY

No Data Supplied

Dagg, Calvin E.

RIVERTON

Manganese Chem. Corp.

Peterson, Donald W.

ROCHESTER

No Data Supplied

Rother, Jack S.

ST. PAUL

F. H. Bathke Co.

Bathke, Alfred S.

Butler Office Inc.

Butler, Patrick, Jr.

Donovan, Const. Co.

Reed, Donald L.

Great Northern Iron Ore Properties

Flinn, William C.

Ray, Philip L.

Great Northern Ry. Co.

Wollenzen, Thomas P.

Iron Ranges Nat. Gas Co.

Warhol, Peter

Lindgren & Lehmann

*Lindgren, Donald W.

Minn. Dept. of Transportation

Berg, Charles W.

Minn. Highway Dept.

Cochran, George R., Jr.

M

Minnesota-Montana

SALEM

Bear Creek Mining Co.
O'Brian, Daniel T.
New Zinc Co.
Teet, John E.
American Metal Climax Inc.
Williams, G. Kemp

SULLIVAN

Murames Min. Co.
Bilheimer, Earl L.
Bent, Douglas W.
Perkins, Ralph C., Jr.
No Data Supplied
Bencze, R. E.
Logue, Hugh Thomas
Brzezinski, Robert F.
Swanson, Kenneth A.
Schwenk, Franklin C.

MONTANA

ANACONDA

Anaconda Company
Boiles, John L.
Day, Frank H.
Foard, Harold
Gale, George D.
Grant, John A.
Greenough, Jackson S.
Holderreid, Francis L.
Jeniker, Frank E.
Kettner, Raymond V.
McCrea, J. Hollis
McDonald, Bernard T.
Miller, Robert B.
Mitchell, Fergus G., Jr.
Stokke, Melvin A.
Wittenberg, Howard E., Jr.
Wersdell, John J.
Tri-City Concrete Prod. Div.
Nicely, Hugh G.
No Data Supplied
Bigley, A. C.
Chestnut, Ben W.
Dahlem, David H.
Davis, William B., Jr.
Dimock, E. P.
Perkin, Herbert C.
Fisher, Truxton J.
Freshour, Chester
Maguire, Hugh J.
Milkwick, Clifford F.
Moore, John R.
Roeder, Fred A.
Ruckwardt, Kurt F.

BILLINGS

Phillips Pet.
Kinard, John C.
U.S. Geological Survey
Larson, Alan H.
No Data Supplied
Foster, W. B.
Johnson, Clarence J.

BUTTE

Anaconda Company
Bonner, Edward O.
Bossard, Floyd C.
Dean, Peter Wm.
Donner, Donald L.
Dougherty, John F.
Drubay, Juel G.
Goddard, Charles C., Jr.
Gwyning, James K.
Hurlbut, Stewart W.
Ingersoll, Robert G., Jr.
Kolesar, John J.
Langfeld, L. Daniel
McAleen, Joseph F.
McCanne, Marcus E.
Peterson, Edward M.
Piper, R. Davidson
Rutledge, Peter A.
Shew, Edward P.
Stewart, Richard Maclin
Strandberg, Fred W.
Suttle, John M.
Tierney, Edward D.
Warren, John W.
Wayment, William R.
Wendel, Herbert A. J.
Zehn, Lester G.
Boland Develop. Co., Ltd.
Young, Herbert G.
General Elec. Co.
Lloyd, H. Richard
Griswold, Jr.
Griswold, George G., Jr.
Hammond-Everly Engrg. Co.
Everly, Walter F.
Hammond, Roy M.
Ingersoll-Rand Co.
Foster, Rodney C.
MacFarland, Roy G.
Kenwood Realty Co.
Wise, T. Chas.

Lerohl, Iver R.
Martin, John M., Jr.
Mohr, Thomas C.
Muckler, Donald B.
Schmidt, Robert L.
Scipioni, Bruno
Arpi, William A.
Skubic Bros. Co.
Skubic, Frank J.
Sulentic, Karl F.
No Data Supplied
Caddy, H. T.
Chase, Paul W.
Davidson, Ferman V.
Handberg, Peter N.
Hool, Laverne E.
Mielke, Morris
Rubow, Irvin H.

WEST VIRGINIA

No Data Supplied
Oja, Ralph K.

WINONA

Brom Machine & Fdry. Co.
*Brom, Leo J. T.

ZIMM

No Data Supplied
Merkve, Jerome G.

MISSISSIPPI

JACKSON

Filtrol Corp.
Millie, Cary T., Jr.
Stockton, Robert J.
No Data Supplied
Mather, Katharine K.

KOSCIUSKO

Magnet Cove Barium
Menze, Richard J.

COLUMBUS

No Data Supplied
Carter, William H.

HATTIESBURG

No Data Supplied
Brown, Bachrell W.
Harding, James L.

NATCHEZ

No Data Supplied
Wells, Alonzo M.
Lum, Daniel

MISSOURI

BONNE TERRE

St. Joseph Lead Co.
Anderson, Sears T.
Bartholomew, Geo. C.
Bilheimer, Lee
Bullock, Richard L.
Clifford, Thomas J.
Cummings, Bradford C.
Duffey, W. D.
Grout, C. MacDonald
Haug, Edward J.
Hoffman, Herbert A.
Howard, John R.
Jones, Elmer A.
Klosterman, Gregory E.
Lane, Marvin E.
Morton, Thomas K.
Redfield, Francis F.
Reed, John J.
Schumacher, Richard L.
Snyder, Frank G.
Turley, Lovell L.
Wagner, Richard E.
Weigel, William W.
Wolf, Edward H.

DE SOTO

De Soto Mining Co.
Thompson, John M.
No Data Supplied
Clemons, Robert E.
Mann, Charles D.
Parkinson, Robert W.
Stockett, N. A.
Weber, John E.
Winkel, Marvin F.

COLUMBIA

Univ. of Missouri
Keller, Walter D.

DESLOGE

No Data Supplied
Grigsby, G. G.
Monroe, Harley L.

ELVINS

No Data Supplied
McCrorey, Geo. T.

FARMINGTON

No Data Supplied
Clark, M. L.

FORT LEONARD WOOD

U.S. Army
Bradley, R. C.
Dawes, Richard E.
Steele, Gordon L.

FREDERICK

National Lead Co.
Coope, George F., Jr.
Krueger, Harold A.
Morris, T. Q.
Phibus, James E.
Niedermeyer, Oscar D., Sr.
No Data Supplied
Rood, J. A.
Smith, C. T.

GLENDALE

No Data Supplied
Hicks, Thomas A.

HANNIBAL

No Data Supplied
Henning, Mike M.

HAZELWOOD

Gardner Denver Co.
Bird, John C.

INDEPENDENCE

Missouri Portland Cement Co.
Seiwald, Donald J.

IRON MOUNTAIN

Erpenbach, Lloyd J.
Hagen, John C.
Matson, Robert P.
Murphy, John E.
Morrison, Bert C.
Staves, Harold T.

JOPLIN

Atlas Powder Co.
Ash, Richard L.
The Eagle-Picher Co.
Atteberry, Wm. D.
Hamilton, Paul R.
Harner, Harold R.
*Ilidge, Robert E.
E. I. du Pont de Nemours & Co.

Cash, Robert O.
General Steel Products Co.
Kirk, Wharton J.
Amer. Lead, Zinc & Smelt. Co.

Netzeband, William F.
*Stewart, Daniel R.
*Nixon, Virgil H.
Potter & Sims

Parker, Leonard P.
Potter, Geo. W.

Wm. M. Stewart Engrg. Co.
*Stewart, William M.

White, Harold H.
Bruce Williams Labs.

*Williams, Bruce

No Data Supplied

Audaley, Glenn L.
Bendelair, Fred N.
*Fowler, George M.

Gray, Howard O.

Jones, P. L.

*Lyden, Joseph P.

Plumb, Carlton H.

Rakowsky, Russell

Wallower, F. C.

KANSAS CITY

Armco Steel Corp.
Bard, Albert L.

*Hagenbuch, Chas. W.

Souder, Arnold

KW-Dart Truck Co.

Clayton, Walter C.

Orelup, Ivan C.

N. KANSAS CITY

Timken Roller Bearing Co.

Powers, Kenneth W.

ELVINS

Electrofrac Corp., Inc.
*Sarapuu, Erich
Spencer Chemical Co.

Thomas, Christopher Y.

*Watkins, Dick R., Jr.

KANSAS CITY

No Data Supplied
*Jung, Frederick W.
Lindo, Raoul V.

KIRKWOOD

No Data Supplied
*McCallum, Jean
*Dunbar, Douglas MacD.

Murill, Randall T.

MINE LAMOTTE

No Data Supplied
Warren, Thomas E.

MEXICO

Kaiser Al. & Chem. Corp.
Fleishman, Howard Gist
Miller Mining Co.

Miller, R. Lary

MONTGOMERY CITY

General Refractories Co.
*Pace, Charles R., Jr.

ORONOGO

Oronogo Mutual Min. Co.
Waring, Guy H.

OVERLAND

No Data Supplied
Moulton, Bernarr G.
Brown, Enoch A., Jr.

POTOSI

National Lead Co.
*Achterberg, Ernest R.
Adair, Donald L.

*Devitt, William

*Hanson, Wm. L.

*Houck, Clarence C.

Kiser, John E.

Sackett, Earl L. H.

RIVERMINES

St. Joseph Lead Co.
Ferguson, Perry N.
Koen, Harold L.

Wykoff, B. T.

ROLLA

No Data Supplied
Kemper, J. Paul

*Hayes, William C.

Wilson, Peter C.

U.S. Bureau of Mines

*Beveridge, Thomas R.

Chester, John W.

*Grenia, James D.

Kenworthy, Heine

Miller, William C.

School of Mines

*Amutz, G. Chris.

Fruzan, Faramarz

Kwentus, Alan H.

Hansen, Spensl M.

Hopler, Robert B., Jr.

*Brownlow, Arthur H.

*Legsdin, Adolph

*Thompson, Dudley

Wilson, Curtis L.

Worley, Morris T.

Yancik, Joseph J.

*Caudle, Rodney D.

*Christiansen, Carl R.

*Clark, George B.

*Grawe, Oliver R.

*Morgan, Ray E.

*Proctor, Paul Dean

Randolph, Earl T.

Reynolds, Burton M.

Roychowdhury, S. N.

Schmid, Milne J.

Travis, R. G.

ST. CHARLES

Uranium Div.,
Mallinckrodt Chem. Wks.

Muldrup, Howard K.

ST. JAMES

Stourton Enterprises

*Stourton, George E.

ST. GENEVIEVE

Mississippi Lime Co.

Fieg, Lothar

ST. LOUIS

Amer. Zinc, Lead & Smelt.

Co.

*Ammon, Robert

*Calhoun, Ralph E.

Cotterhill, Carl H.

Dobbel, Chas A.

*Meek, Fred J.

Amer. Manganese Steel Div.

Baker, John H.

Peabody Coal Co.

Arnold, Cecil P.

Burkhardt, Fred R.

Eifred, F. Stillman

Guthrie, Cecil M.

Hagen, Hubert D.

Keice, Merl C.

Lamm, Arnold E.

Maassmann, Albert P.

McCollum, H. C.

O'Loughlin, Ivan

Quenon, Eugene E.

Wilbur, Wilbur A.

Mine Safety Appliances Co.

*Buyes, W. W.

Bristol Co.

*Armstrong, Gerald C.

Mico Min. & Milling Co.

Baileson, Albert

W. R. Bendy Cement

Engineers

*Bendy, W. R.

Joy Mig. Co.

Bergman, George W.

Jones, Walter M.

Centrifugal & Mechanical

Inds. Inc.

*Bigley, P. W.

Bildback, James E.

Williams Crusher Co.

*Braun, August L.

Wm. Taggart & Co.

*Brazill, M. P., Jr.

Valley Dolomite Corp.

Day, Henry P.

Donnell, Ben P.

Minerva Oil Co.

Desloge, Joseph

Desloge, John J., Jr.

Jones, Berkley

Monsanto Chemical Co.

Emigh, G. Donald

Hurst, Thomas L.

Frazier Dachs Const. Co.

*Gunner, Roy J.

H. K. Porter Lechen Div.

Hartup, R. Rex

Union Elec. Co.

*Heck, Henry W.

Ludlow Saylor Wire Cloth

*Hogan, Virgil R.

Euclid Sales & Service Inc.

*Lake, Thomas R.

American Cyanamid Co.

Lowe, R. H.

Missouri Pacific R. R.

O'Brien, Earl Patrick

Sverdrup & Parcel

*Pence, Harry S.

Hewitt-Robins Inc.

Purnett, Arthur S.

Allis Chalmers Mfg. Co.

Quinn, Joseph S.

Boyles Bros. Drilling Co.

Sainsbury, Ferris E.

Atlas Copco Eastern

Simmerling, Stanley K.

Shasta Coal Corp.

Stevens, E. F.

Carl G. Stiefel Reality Co.

*Stiefel, Carl G.

Surder Corp.

Swooboda, Raymond B.

Ortruc Inc.

Weidlich, Gilbert A.

No Data Supplied

*Bain, C. Kremer

Blum, Victor J.

*Davis, Robert I.

Finkl, John W.

Fetch, Robert M.

Frank, A. J.

Montana-Nevada

Mont. Bur. of Mines & Geol.	GARRISON	RIVERTON	Park, Edwin F.	Bureau of Land Mgmt.
*Chelini, Joe M.	Montana Phosp. Prod. Co.	No Data Supplied	Hove Sound Co.	*Hollingsworth, Edgar A.
Mont. School of Mines	Bell, Leslie V.	Ziegler, Jay R.	Campbell, John B.	Cooke, Everett & Assoc.
Adami, Arthur E.	Burnet F. E.		*McCarroll, Sidney J.	*Cooke, H. R., Jr.
*Cox, Willard E.	Utah Const. Co.		Manganese, Inc.	Eagle-Picher Co.
*Crowley, Frank A.	Smith, Donald C.		Douglas, E. B.	Kenney, John W., Jr.
Earll, Fred N.			Hawkins, Charles S.	*Steinheimer, Milton
*Fisk, Henry G.	GREAT FALLS		Stauffer Chemical Co.	Getchell Mine, Inc.
*March, W. S., Jr.	The Anaconda Co.	No Data Supplied	Newell, Arthur T.	*Hardy, Roy A.
*McGlashan, Donald W.	Balhiser, Robert H.	Nissen, William L.	Titanium Metals Corp. of Amer.	Homestake Mining Co.
*Sahinen, Uuno M.	Cadwell, Graham M.		Eck, Laurence T.	Parker, Breck
*Stout, Koehler S.	DeArmond, Charles F.		Love, Frank E.	Isbell Const. Co.
*Vine, William A.	No Data Supplied		Pope, Charles R.	*Isbell, C. V.
*Young, Francis M.	Dunham, C. R.		*Ray, Donald M.	Krupp, Luther M.
Mont. State Highway Comm.	Villeneuve, M. J.		U. S. Lime	Laughton, George L.
*Matthew, Richard R.	HAMILTON		Ellis, Wm. E.	Mackay School of Mines
Rusaken Mining Co.	No Data Supplied		MacDonald, John C.	*Butler, John N.
*Judd, Kenneth M.	Blackburn, Gordon L.		No Data Supplied	*Nelson, Harve P.
Texaco Inc.			Rosenberg, Barry	*Payne, Anthony L.
*Hoe, Robert D.				*Scheid, Vernon E.
U.S. Dept. of Justice				*Schilling, John H.
*Booky, Jack H.				Voskuil, Walter H.
Victor Chem. Works				Nevado Mineral Labs, Inc.
Johnson, Henry F.				*Parker, J. B.
Westinghouse Electric Corp.				Siskon Corp.
Clapp, Glenn H.				Chessher, Hubert B., Jr.
No Data Supplied				Chessher, H. B., Sr.
Ahrens, Ernst H., Jr.	State Board of Health			Sweepstakes Mines Inc.
Antonioli, Frank M.	"Hunt, Homer M.			*McDonald, Joseph F., Jr.
Archibald, James K.	No Data Supplied			Union Carbide Nucl Co.
Ash, Samuel	Clow, Lyle F.			Morgan, James E., Jr.
Geach, Robert D.	Collins, Ted E.			Vitz, Howard E.
*Bishop, Jack C.	Miller, Richard N.			Wharton, Heyward M.
Bishop, L. F.	*Nelson, Robert H.			U.S. Atomic Energy Comm.
Bowasher, John A.	*Rawles, William P.			Schwartz, Roland J.
Briney, William J.				U.S. Bureau of Mines
Brown, Ray O.				*Engel, A. L.
Champ, Clarence A.				Long, Albert E.
Dreyer, Johannes P.				University of Nevada
Driscoll, James E.				*Horton, Robert C.
Dugdale, Raymond				*Lawrence, Edmond F.
Farmin, Jeremy C.				*Newman, Harold C.
Gallant, Raymond B.				*Olson, Richard H.
Gidel, Muri H.				*Slemmons, David B.
Goddard, Bruce B.				*Weyler, Paul A.
Gulilbert, John M.				No Data Supplied
Hannifan, Martin K.				Adams, Clark N.
Jaccard, Frederick C.				Adams, Roderick W.
Jordan, Theodore S.				Austin, W. G.
Legatt, Alexander				Beal, Laurence H.
Linfirth, F. A.				Carpenter, Jay A.
Lukins, Thomas C.				*DeLongchamps, Fred J.
Matthews, Chas. S.				*Friberg, Morris E.
*McAuliffe, D. C.				Galli, Peter E., Jr.
*McCarthy, Lawrence J.	American Chrome Co.			Gianella, Vincent P.
Norem, William C.	Adler, James E.			Gordon, Louis D.
O'Brien, W. A.	Bley, John			Hammond, Claude W.
Peyton, Sidney B.	Harris, Dwight L.			Hart, James P.
Renourd, E. I., Jr.	Stanford, James V.			McGirk, Lon S., Jr.
Richardson, Allan S.				*Hilli, Starr, Jr.
Rule, Albert R.				Johnson, A. C.
Sikkar, Johan				*Johnston, William P.
Du Toit, P. J. G.				*Liddell, Parker
Treweek, Harold B.				*Lohse, Fred
Weisner, Robt. C.				Mecham, F. J.
Wilks, R. S.				Muth, Edmund A.
Williamson, William				*O'Connor, Arthur J.
Wright, Morgan H.				Rice, Andrew C.
Zipperian, D. E.				Richardson, Warren B.
BOZEMAN				Richardson, Warren V.
Gold Reserve Mining Co.				Ricker, Spangler
*Garwood, Robert G.				*Riker, O. Perry
COLUMBIA FALLS				*Schadrack, Erich J.
Anaconda Aluminum Co.				*Sheehan, Benjamin H.
Hanson, George T.				*Silver, Albert
COLUMBUS				*Smith, Alfred M.
No Data Supplied				Spitzer, Robert B.
Gaethke, F. P.				Stathis, George J.
DARBY				*Stephenson, Edgar L.
Cummings-Roberts Darby				Summers, Stanley C.
Fluor.				Temp, Edward W.
*Taber, John W.				*Van Voorhis, B. W., Jr.
DEER LODGE				Wigglesworth, R. M.
No Data Supplied				
Hendricks, D. A.				
Martin, Thomas W.				
DILLON				
Hand Mines				
*Hand, William M.				
No Data Supplied				
Taylor, Gordon P.				
EAST HELENA				
American Chem. Corp.				
Porter, William H.				
A. S. & R. Co.				
*DeLude, Charles T.				
No Data Supplied				
Cox, William R.				
Loughridge, K. D.				
GARRISON				
Montana Phosp. Prod. Co.				
Bell, Leslie V.				
Burnet F. E.				
Utah Const. Co.				
Smith, Donald C.				
GREAT FALLS				
The Anaconda Co.				
Balhiser, Robert H.				
Cadwell, Graham M.				
DeArmond, Charles F.				
No Data Supplied				
Dunham, C. R.				
Villeneuve, M. J.				
HAMILTON				
No Data Supplied				
Blackburn, Gordon L.				
HELENA				
State Board of Health				
"Hunt, Homer M.				
No Data Supplied				
Clow, Lyle F.				
Collins, Ted E.				
Miller, Richard N.				
*Nelson, Robert H.				
*Rawles, William P.				
KALISPELL				
No Data Supplied				
Kraft, Paul				
MARYSVILLE				
No Data Supplied				
Wade, W. R.				
MISSOULA				
No Data Supplied				
Murphy, James P.				
Walters, Ray E.				
NYE				
American Chrome Co.				
Adler, James E.				
Bley, John				
Harris, Dwight L.				
Stanford, James V.				
PHILIPSBURG				
Taylor-Knapp Co.				
Johnson, D. S.				
*Knaebel, Charles P.				
Taylor, Alvin V., Jr.				
HED LODGE				
No Data Supplied				
Brophy, James R., Jr.				
ROUNDUP				
The Roundup Mining Co.				
Johnson, W. J.				
STEVENSVILLE				
No Data Supplied				
Evans, James R.				
TOWNSEND				
Northern Milling Co.				
*Sweeney, Peter H.				
WALKERVILLE				
No Data Supplied				
Vandeever, Paul L.				
WHITEFISH				
No Data Supplied				
Dixon, Wallace J.				
ZORTMAN				
Gold Reserve Mining Co.				
*Lund, Robert L.				
NEBRASKA				
CONDON-CUNNINGHAM CO.				
Dirkes, George E.				
Union Pacific Coal Co.				
Bayless, I. N.				
OMAHA				
Getchell Mine, Inc.				
*Newman, William J.				
Nojima, Tetsuo Roy				
GOODSPRINGS				
Schenendoah Corp.				
*Wilson, Blake				
Basic, Management, Inc.				
Howard, Victor T.				
RIVERTON				
No Data Supplied				
Ziegler, Jay R.				
SIDNEY				
No Data Supplied				
Nissen, William L.				
NEVADA				
BATTLE MOUNTAIN				
Bootstrap Mine				
Fisher, Marion S.				
Magnet Cove Barium Corp.				
*Seldin, Marvin B.				
No Data Supplied				
Hoalst, Blaine C.				
BEOWAWE				
Goldacres Mine				
Treweek, Harry W.				
BLUE DIAMOND				
Blue Diamond Corp.				
*Cain, J. H.				
Walldhausen, H. L., Jr.				
*Weils, Herbert C.				
No Data Supplied				
Brooks, Marion C.				
BOULDER CITY				
No Data Supplied				
Dieleman, Jake W.				
Mead, Tom C.				
CARSON CITY				
Dayton Cons.-Mines Co.				
*Weideman, Robt. R.				
Utah Constr. & Mining				
Smith, Frederick L.				
No Data Supplied				
Dondero, F. N.				
Larsh, Walter S.				
EAST ELV				
Marc, Inc.				
*Erickson, Einar C.				
Prospector Labs				
*Berge, Byron T.				
ELKO				
Mt. City Uranium Co.				
*Radiey, Otto C.				
ELY				
Ely Gold Mining Co.				
Walker, Wm. J.				
No Data Supplied				
Coulthard, John F.				
Zunino, John				
EMPIRE				
U. S. Gypsum Co.				
*Paulsen, John C.				
EUREKA				
Eureka Corp., Ltd.				
*Breckenridge, Robert N.				
No Data Supplied				
Paroni, Walter A.				
GABBS				
Basic, Inc.				
Dixon, Augustus M.				
Sullivan, George L.				
Sutton, Raymond E.				
Willard, Harrold P.				
Gabbs Exploration Co.				
Duggan, Lee D.				
Standard Slag Co.				
Eavosovic, Mike				
Gaylord, G. B.				
Jones, Robert O.				
Maher, William C.				
Wood, Archie C.				
No Data Supplied				
Cahill, Thos. M.				
Gilroy, U. B.				
GOLCONDA				
Getchell Mine, Inc.				
*Newman, William J.				
Nojima, Tetsuo Roy				
GOODSPRINGS				
Schenendoah Corp.				
*Wilson, Blake				
Basic, Management, Inc.				
Howard, Victor T.				
RENO				
The Anaconda Co.				
Jones, John K.				
Wilson, James R.				
A. E. Anderson, Engineering				
*Anderson, Andrew E.				
TUNGSTEN				
Nevada-Massachusetts Co.				
*Caldwell, James R.				
Gronning, Ralph L.				
Nash, Eldridge				
*O'Keefe, Daniel A.				
VALMY				
No Data Supplied				
Taylor, C. M.				

Nevada-New Jersey

WEED HEIGHTS	CARLSTADT	HOBOKEN	Porter, Urquhart, McCarthy & O'Brien *Mariowe, Sherwood V.	RIVEREDGE
The Anaconda Co. Burch, Henry R. Clemens, Thomas F. *Gill, Donald K. Gould, Allison J. Greene, Thomas A. Keith, Frank A., Jr. *Morringer, Frank M. No Data Supplied Jacky, H. W. McMahan, Jack E. Millar, A. E.	No Data Supplied Dwyer, Thiel E.	West & Associates West, Woodrow W.	No Data Supplied Vandenberg, Jacob Volkman, Henry W.	
WELLINGTON	CARTERET	HOPATCONG	NEW BRUNSWICK	RIVER VALE
No Data Supplied *Annett, Norman T.	Amoco Res. Inc. Symonds, I. M.	No Data Supplied Shearer, John L.	Rutgers Univ. *Lodding, William No Data Supplied Hammell, Laurence	No Data Supplied Reedy, Richard W.
WINNEMUCCA	CHATHAM	JERSEY CITY	NEWFIELD	ROSELLE
Baldwin Mercury Mine Baldwin, Herbert W. Jackson Mt. Mining Co. *De La Mare, Grover W. No Data Supplied Hutton, Wm. Alex *Price, Marion E.	No Data Supplied Evans, W. F.	Leonard J. Buck Inc. Buck, Leonard J. Hoguet, J. Peter The Gallagher Co. *Miller Jack S.	Shieldalloy Corp. Clymer, W. Bruce	Ingersoll-Rand Co. Aldridge, Walter V. Sies, John R.
VERINGTON	CLIFTON	KENILWORTH	NEW PROVIDENCE	SCOTCH PLAINS
The Standard Slag Co. *Harcourt, Milo M. Harmon, John R. No Data Supplied Campbell, Robert L. Mackenzie, A. E., Jr.	Magnetic Eng. & Mfg. Co. Ferris, James J.	Adamas Carbide Corp. Fischer, Albert J.	No Data Supplied Mentch, Robert L.	No Data Supplied Hatiff, R. H. *Worth, James S.
NEW HAMPSHIRE	CRANFORD	LEONIA	NORTH HACKENSACK	SHORT HILLS
CLAREMONT	No Data Supplied Garland, Acel	No Data Supplied Aldrich, Henry R. Bohn, Charles A.	Compressor & Rock Service Corp. *Devitt, Martin E. Gardner Denver Co. Burke, Jack J.	No Data Supplied Campbell, Robert, Jr.
Joy Mfg. Co. Curtis, John C. Osgood, R. C., Jr. No Data Supplied Smith, Duray	DOVER	LONG BRANCH	OGDENSBURG	SHREWSBURY
CONCORD	Alan Wood Steel Co. *Karchmer, Nathan K. Kertt, John P. Meyers, Laurence V.	No Data Supplied Sigler, Glenn E.	No Data Supplied Hastings, Warren	No Data Supplied Hymer, H. G.
EXETER	Picatinny Arsenal Doyle, Walter J. Shahmoon Ind. Inc. Palomo, John C. *Soussa, Maurice S.	MAHWAH	OXFORD	SOUTH AMBOY
FRANKLIN	No Data Supplied Brophy, Martin J. Kamener, Basil	Amer. Brake Shoe Co. Avery, Howard S. Smith, Frank W.	Alan Wood Steel Co. Fife, Lawrence Keats, Wilfred J. McInerney, Robert M.	National Lead Co. Alessandrini, H. V. Cole, Sandford S. Lynd, Langtry E.
ELIZABETH	DUNELLEN	MANVILLE	PARAMUS	SOUTH BOUND BROOK
HANOVER	R. Hoe & Co. Inc. Reid, John W.	Johns-Manville Corp. Blair, Laurence R. *Cummins, A. B. Kadet, Frederic L. King, Herbert L. Streb, William C.	Atlas Copco Eastern Inc. Corrigan, Graham H. Goodwin, Donald J.	No Data Supplied Luty-Lutenko, Alex
LEBANON	E. ORANGE	MARTINSVILLE	PASSAIC	SOUTH ORANGE
Thermal Dynamics Corp. Benson, Clarence B.	No Data Supplied Berglund, Robert H. Rodgers, A. T.	No Data Supplied Brady, E. H.	Hewitt-Robins Inc. Asman, Arnold W. *Lautenschlaeger, H. C. *Ritmeester, Henry, Jr., Jr. Ross, Hamilton M.	No Data Supplied Stanwick, Charles A.
NO. HAMPTON	ELIZABETH	MATAWAN	OXFORD	SOUTH PLAINFIELD
SALEM	American Marietta Co. Noel, Don O. Genesia Kolin Co. Murray, Haydn H. James Equipment Inc. *James, Ulysses S.	ELIZABETH	Atlas Copco Eastern Inc. Corrigan, Graham H. Goodwin, Donald J.	Amer. Smelt. & Ref. Co. Haagensen, R. B. Stiecken, Charles E. Kranz, Paul J.
NEW JERSEY	Gilbert M. Kilcarr *Kilcarr, Gilbert M. Victaulic Co. of Amer. English, Richard W.	ENGLEWOOD	PASSAIC	SPARTA
BERNARDSVILLE	ENGLEWOOD	No Data Supplied Burris, Michael M. Loveman, Michael H.	Hewitt-Robins Inc. Asman, Arnold W. *Lautenschlaeger, H. C. *Ritmeester, Henry, Jr., Jr. Ross, Hamilton M.	Thomas F. Mynea Mynea, Thomas F. No Data Supplied Flinn, Alfred R.
No Data Supplied Mankin, Montagu, Jr.	ESSEX FALLS	ESSEX FALLS	MARTINSVILLE	SPRINGFIELD
BLAIRSTOWN	FAR HILLS	No Data Supplied Anderson, Wm. W., Jr. *Kemp, Lorin W. Vogt, Thomas L.	No Data Supplied Brady, E. H.	No Data Supplied Forse, S. Lennart *Worthington, Joseph E.
No Data Supplied Kynor, Herbert D., Sr.	FLEMINGTON	MONTCLAIR	MATAWAN	SUMMIT
BOONTON	No Data Supplied "MacFarlane, J. K.	No Data Supplied Huber, Charles F. Sawyer, Geo. P.	MIN. & CHEM. CORP. OF AMER.	Arrow Corp. *Jungersen, Thoger G., Jr.
Norda Ess. Oil & Chem. Co. Amaducci, Louis	FORDS	MORRISTOWN	PHILLIPSBURG	No Data Supplied Canada, John B. Marble, Earl R., Jr.
BOUND BROOK	No Data Supplied Shimko, Joseph	Allied Chem. Corp. Pennington, James R. Trepp, Wilbert J. Ringgold Coal Mining Co. *Peters, James W.	INGERSOLL-RAND CO.	TEANECK
Research-Cottrell Inc. Schork, John E.	FRANKLIN	No Data Supplied "Cromwell, Robert H.	*Shepherd, Benjamin F. Wassel, Michael J.	Ledoux & Co. Inc. Adkins, Robert C. Ledoux, Louis Pierre Thomsen, Denton
BRANCHVILLE	N. J. Zinc Co. Callahan, William H. McKechnie, Donald	MOUNTAIN LAKES	PLAINFIELD	No Data Supplied Bryers, Wesley E.
Willis, Paul & Proctor Inc. *Willis, Sherred A.	No Data Supplied Haight, Clarence M.	No Data Supplied Orsino, J. A. *Stewart, Alex	POMPTON LAKES	TENAFLY
BURLINGTON	HACKENSACK	MT. HOPE	PRINCETON	TRENTON
U. S. Pipe & Fdy. Co. Schuh, Arthur E.	The Gregg Co. Ltd. Galit, Henry	Shahmoon Ind. Inc. *Hagerman, Robert M.	Princeton Univ. *Bonini, William E. *Kalliokoski, J. *Sampan, Edward	Bureau of Geol. *Parrillo, Daniel G. Widmer, Kemble
CALDWELL	Metronic Eng. Co. Inc. Leitner, Adolph F.	MURRAY HILL	No Data Supplied No Data Supplied Thom, W. T., Jr.	S. G. Frantz Co. Inc. *Frantz, Samuel G. N. J. Geological Surv. *Markewicz, Frank J.
Fenwick Machinery Inc. *Fenwick, Paul	HANOVER	Air Reduction Co. Koch, Eugene	RED BANK	United Clay Mines Corp. Carlson, Roger M. Hall, Clyde W. Guenther, Wm. F. Lee, Gordon W. Peck, Douglas R. Rider, William L.
SOCIETY OF MINING ENGINEERS OF AIME	Dale & Rankin Graddon, Fred C.	NEWARK	RIDGEFIELD PARK	No Data Supplied *Johnson, Meredith E.
	Linde Co. Fleming, D. H., Jr. Rolleth, Harold C.	Linde Co. Fleming, D. H., Jr. Rolleth, Harold C.	MOUNTAIN LAKES	UNION
			No Data Supplied "Zima, Pavel	Air Reduction Co. Inc. *Crowe, John J. No Data Supplied Ziesling, Gordon Zimmer, Peter F.

New Jersey-New York

UNION CITY

No Data Supplied
*Michenfelder, Frank

UPPER MONTCLAIR

No Data Supplied
Faulkner, R. H.
Roebuck, John H.

VINELAND

No Data Supplied
*Osborn, Franklin H.
Skinner, E. V.

WESTFIELD

No Data Supplied
*Corbett, Clifton S.
Costanzo, F. X.
Davis, G. H.
Edson, Thomas F.
Fraser, O. B. J.
Gruner, Frederick R.

WEST NEW YORK

No Data Supplied
Pelluccio, T. Jr.
Walsh, Myles A.

WEST ORANGE

Thomas A. Edison Ind.
Weeks, Robert H., Jr.
Philip S. Miller & Assoc.
*Miller, Philip S.

WHARTON

No Data Supplied
Morvath, M. J.

WHIPPANY

General Electric
*Haushild, Louis W.

WOOD RIDGE

Curtiss-Wright Corp.
Tillson, Ben. F., Jr.,

NEW MEXICO

ALBUQUERQUE

Henry S. Birdseye
*Birdseye, Henry S.
Chapman, Wood & Griswold
*Griswold, Gilbert R.

*Wood, John A.

Cole, Mineral Metals Co.

*Cline, Edward T.

Hall Engineering Corp.

*Hall, LeRoy E.

Kaiser Gypsum Co.

Read, Myron

Lovelace Foundation

Taborelli, R. V.

See Tee Mining Corp.

Schultz, Raymond L.

U. S. Air Force

*Dixon, Roy W.

U. S. Forest Service

Tragett, E. Rowland

University of New Mexico

Kelley, Vincent C.

No Data Supplied

*Ashlock, Walter Tyson

Baca, Florentino B.

Barkley, Raymond C.

Bee, Jack P.

Boyd, Thomas A.

Brown, H. G. III

Devilliers, Wm. R.

Garcia, John A.

Goldsmith, Louis H.

Haley, Fred S.

Hardin, M. M.

Hostetter, G. E.

Hearon, Henry H.

Jenkins, R. W.

*Leland, George R.

Mitchell, G. W., Jr.

Reynolds, J. V.

Tomerlin, Marcus M.

Warner, George A.

BAYARD

U. S. Smelt, Ref. & Min. Co.

Glover, Gordon T.

Jess, Donald A.

No Data Supplied

Newell, Oliver J.

CARLSBAD

Duval Sul. & Pot. Co.

Bourne, Douglas J.

Gasperich, John J.

Li, Hon C.

*Magraw, John W.

McGuire, Benjamin F.

Taylor, Randall H.

Tippin, Robert B.
Tong, Jerry E.
Unger, Walter H.
Farm Chemicals Resour. Dev. Corp.

Hicks, Charles W.
Kindsvater, E. F.

International Minerals & Chem. Corp.

Almy, Adrian L.

Dancy, W. B.

Davis, Farlow C.

Houghland, Robert W.

Pressnell, Clarence E.

Skinner, E. C.

National Potash Co.

Ferguson, Thomas G.
Potash Co. of Amer.

Billings, Robert G.

Clarris, Houston N.

*Cummings, Joseph B.

Dabney, Robert R.

Fritsch, J. Melvin

Knill, Raymond R.

Schoeld, Edmund A.

*Schreiner, Paul E.

Southwest Potash Corp.

Herbert, Iris A.

Mitchell, J. S.

Smith, W. Aubrey

Union Industrial Corp.

O'Kelly, James C.

U. N. Tech. Ass.

*Douglas, E. W.

U. S. Borax & Chem. Corp.

*McCloskey, Lee E.

*Miller, Earl H.

Pierson, Francis L.

Wright, John Sterling

McWhorter, William S.

U. S. Geol. Survey

Fulton, Robert S.

Hager, James W.

McConnell, Chas. M.

*Reeder, Robert T.

Wertheim Agency Inc.

Sparks, Norman E.

No Data Supplied

Alport, R. H.

Abernethy, Chas. W.

Baumann, William F.

Borskey, J. W., Jr.

Bunnel, L. H.

Childers, Charles E.

Christo, Sam, Jr.

Clark, Howard P.

Corbin, Lawrence P.

Cramer, Thomas M.

Davis, F. O.

Erskine, Neil M.

Gant, Joseph E., Jr.

Gordon, J. D., Jr.

*Harley, George T.

Harrison, Marvin H.

Haworth, Russell

Johnson, Franklin E.

Johnston, Charles E.

Jourdan, Everett C.

Kartchner, M. W.

Keller, E. C., Jr.

McCloskey, J. W.

McKechnie, B. E.

Murdock, James D.

Nelson, Richard B.

Prots, D. F.

Roth, Edward P.

Stoutenberg, Allan D.

*Weaver, Gaylord C.

Zandorn, Victor A.

DEMING

No Data Supplied

*Cannizzo, John

*McCray, Hugh E.

FARMINGTON

Franklin Supply Co.

*Yoder, Gene F.

San Juan Gravel Prod. Co.

*Hargrove, Don

Utah Construction Co.

Evans, Hugh W.

No Data Supplied

Fowler, Shannon A.

GALLUP

Phillips Petro. Co.

*Haller, Harry F.

Milne, Steve L.

*Moe, Richard F.

No Data Supplied

Coffey, William G.

GRANTS

Anaconda Co.

Arlin, Zana Earl

Beck, Theodore R.

Cook, F. Stearns

Glover, J. Harvey

Gray, Donald P.

Hendren, John P.

Kelley, Charles W.

Kittel, Dale

Matthews, Dale C.

Packer, Edson R.

Pearson, John E.

Peterson, E. Clarence

Riddell, Horace C.

Roberts, William J.

Veeder, Arthur K.

Boyles Bros. Drilling Co.

C. & H. Inc.

*Johnston, Glenn C.

Calumet & Hecla Inc.

Hays, Richard A.

*McKereghan, George F.

Four Corners Explor. Co.

Barry, L. D.

*Rapaport, Irving

James Hamilton Const. Co.

*Hamilton, James

Hidden Splendor Min. Co.

Collins, William D.

Perrin, James R., Jr.

*Powers, Harold A.

Von Moss, Edward

Homestake Mining

Bird, Harvey O.

Crosby, Allen F.

*Crouch, Robert L.

Daugherty, Maxwell

*Delicate, Donald T.

De Jong, Leonard C.

Derrer, Homer A.

Garmann, Clyde N.

Gould, Walter R.

Graber, E. A.

Jones, Jack Q.

*Madsen, Roger A.

Markosky, Charles E.

Mehle, Raymond J.

Osborn, Clyde E.

Rizzoli, Theophilus M.

Robison, Joe T.

Hart, Thomas

Hartnett, Kenneth G.

Hill, Victor L.

*Kirk, David L.

*Logue, James D.

Milligan, Wayne A.

Nugent, Leo J.

Patrick, Roger B.

Pertile, Rodney K.

Sallee, Graydon L.

Stanley, Charles F.

Swanson, John M.

Vanderpool, John S.

Ward, Milton H.

Woody, R. J.

Zambas, Peter G.

Lance Corp.

Melancon, Paul E.

Phillips Petro. Co.

Berg, L. Jerome

Brown, Joseph F.

Everts, Jason E.

Ferguson, Donald R.

Gibbs, Clinton M.

Greenslade, James O.

Halls, Wm. W.

Owen, James R.

Ruoho, Armas A.

*Russell, Bruce E.

Plateau Hardware Inc.

Manson, G. W. Jud

Rare Metals Corp. of America

Lomas, R. E.

U.S. Atomic Energy Comm.

Grutt, Eugene W., Jr.

Speis, Alex J.

Tipton, William D.

No Data Supplied

Alkhafi, Fadhl A.

Andrus, Niles J.

Bales, William E.

Byrd, R. C.

Casper, Marion

Caywood, Roger M.

Coile, James J.

Connell, M. A.

Covert, J. D.

Dolezal, Wayne R.

Drips, Robert C.

Durfee, Jay W.

Gebeau, Arthur E.

Harper, Aaron V.

Kell, Howard R.

Lyons, Lamar

Makare, James H.

Mathis, Gerald C.

McMillan, G. A.

Miller, G. Old L.

Miller, Phillip R.

Moulton, Wesley G.

Oberg, Fred N.

O'Brien, Robert D.

Ritter, Norton R.

Robison, Howard R.

Smith, Murray T.

Turberville, G. D.

Young, Thomas W.

Zundel, Weldon P.

HACHITA

No Data Supplied
Twitchell, C. Lamont

HANOVER

American Zinc, Lead & Smelting
Conley, Leslie J., Jr.

N. J. Zinc Co.

*Langdon, Charles F.

Snel, C. C.

Winslow, Kenneth R.

Perry Mining Co.

Faust, Jerry W.

HOBBS

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Day, Robert J.

HOLLOMAN

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*Brown, John P.

HURLEY

Kennecott Copper Corp.

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No Data Supplied McQuade, Victor J.	No Data Supplied Nouza, Roger	Weaver Matl. Service Weaver, Fred L. Weaver, Don S.	Newton Falls Paper Mill Inc. Ross, Alex M.	Anaconda Wire and Cable Co. Peck, C. B., Jr.	
BABYLON	ELMIRA	KEESEVILLE	NEW YORK CITY	Andes Copper Mining Company Rood, Alfred D. Trask, Frank, Jr.	
N. Y. State Dept. of Public Works *Rose, Newton	Latta Brook Corp., Weigand, Glenn R.	Nothern Minerals Inc. "Burnham, D. Koert	Adams & Peck "Le Maire, Edward	Geo. S. Armstrong & Co. Inc.	
BALDWIN	FLUSHING	KEW GARDENS	AIME	*Armstrong, George S. Asea Electric Inc.	
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St. Joseph Lead Co., Dill, David B., Jr. Henry, Ralph L. Jones, Marshall G. LaPrairie, J. P. Lowry, Malcolm V. Reilly, John G., Jr. Riley, Mark E. Wade, Delbert M., Jr.	No Data Supplied Hall, Robt. D.	No Data Supplied Elkan, Benno Pollock, C. P.	*Moore, Philip C. Petrinovic, Alex A. Puttuck, Harry E.	*Holloway, Edward Barstow & Mulligan Antonova, Helen A.	
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No Data Supplied Bulin, George V., Jr.	Oro Mining Co. Williams, George B.	LOCKPORT	American Cyanamid Co. Bloch, F. William, Jr. Caldwell, Edw. P. Caldwell, A. Blake, Jr. Collinge, Barton M. Frith, Charles W. Griffin, Frank A.	Behr, Dolbear & Co. Banfield, Armine F. "Clarke, Vinton H. "Counselman, Theodore B. "Dolbear, Samuel H. "Donald, Douglas D. "Hodges, Park A. "Madison, Frank H. Richard J. Buck & Co. Olmstead, Joseph N.	
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EAST MEADOW	JAMAICA	NEW ROCHELLE	Andacollo Min. Ltd. "Strouth, Howard Steven	Anaconda-Jurden Assoc. Inc.	
No Data Supplied Ahy, Vincent P. Sample, Mat	No Data Supplied Allara, Carl M. Pfouts, C. Y.	No Data Supplied Schmid, Walter P.	Brinckerhoff, Charles M. "Brown, Calvin C. Campbell, Thomas A. Cooney, Richard L. Dwyer, Robert E. "Hoffman, John M. Laird, Frederick McGhone, Edward S. Nelson, David R. Newlin, Richard S. Parkinson, C. Jay Perry, Vincent D. Quigley, William E. Sales, Reno H. Schnieder, Ralph E. Swaine, William H. Traversone, Frank J. Weed, Clyde E.	Carpenter, Stewart "Gadkowski, Walter Holtz, Theodore H. Kuralt, Richard M. Manning, John P., Jr. O'Rourke, John T. Otto, Arthur L. Raffo, Edward F.	

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Coronado Corp.
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Crucible Steel Co.
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Cyanamid International Hartjens, Hermen
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 *Meyers, Bernard M.
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Enggr. & Min. Journal Elgo, Daniel P.
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Gardner Denver Co.
 Martinez, Evaristo
 Morgan, Ross H.
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R. Hoe & Co.
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 Hersey, Gordon R.
 *McCormack, Maxwell L.
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Wiendl, Joseph A.
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Inspiration Cons. Copper Co.
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 Jesse M. Robinson C.P.C.U.
 *Robinson, Jesse M.
Intl. Minerals & Metals Corp.
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Johnstown Coal & Coke Co.
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Joy Mfg. Co.
 Archibald, Donald L.
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 Miller, Clifton W.
 Williams, Philip M.
 M. W. Kellogg Co.
 Mundaca, Ciro T.
 *Swart, John A.
Kennecott Copper Corp.
 Atkinson, John R.
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 Simpson, James R.
 Snapp, John B.
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 *Herschelman, Eugene C.
 Shafer, Maurice
Keuffel & Esser Co.
 Sharps, Thomas I.
 Alan Kissock & Co.
 *Kissock, Alan
 Klilklo Corp.
 Austin, Albert M.
 Henry Krumb (School of Mines)
 *Arbiter, Nathaniel
 Lajo Mines, Ltd.
 *Wolf, Harry J.
Lazard Freres & Co.
 Forsch, Frederick D.
Lead Ind. Assn.
 Ziegfeld, Robert L.
Leggette, Brashears & Graham
 *Graham, Jack B.
Lehman Bros.
 Lindley, Albert Hole, Jr.
 Schultz, Harry C.
Leytess Metal & Chemical Corp.
 Leytess, Eugene
 Lindeteves, Inc.
 Van Naerssen, Edward J.
Link Belt Co.
 Ulrich, George H., Jr.
Lone Star Cement Corp.
 Van Zandt, Clairborne C.
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 *Merritt, Phillip L.
Malcolm Pirnie Engrs.
 Pirnie, Malcolm
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 *Chellison, Harry C.
 *Faiz, Salih
 *Flowers, Alfred E.
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 *McCrossin, Edward F.
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 *Piana, Louis D.
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 Fenner & Smith Inc.
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 Norrie, Lanfear B.
 *Wariner, Lendall P.
Metal Traders Inc.
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 Tatman, John L.
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 Levenson, Milton
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 *Dodge, Basilio
Molybdenum Corp. of America
 *Bailey, Harold D.
Morgan Guaranty Trust Co. of N. Y.
 Katravsky, Joseph
 Natl Assoc. of Mfgs.
 *Cannon, Daniel W.
 Natl. Carbon Co.
 Pitt, Wm. G.
National Lead Co.
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 Martino, J. A.
 Mayer, Andrew
 Reiser, Allan R.
 Stranad, Joseph
 Wiles, Gloyd M.
 Wunder, George W.
National Zinc Co. Inc.
 *Jeffrey, Frederick R.
 Reid, Joseph H.
New Jersey Zinc Co.
 Bulmer, Donald C.
 Goodwin, Sidney S.
 Johnson, Lindsay F.
 Kent, Robert G.
 Kykhynen, Pentti W.
 McCann, R. L.
 Ostgren, Gottfrid L.
 Pettijohn, W. T.
Newmont Explor. Ltd.
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Newmont Min. Corp.
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 Grunow, John E. D.
 Banghart, Marcus D.
 Livermore, John S.
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 *Arlshuler, H. I.
 Anderson, Homer S.
 Reilinger, Robert M.
 Robinson, Harold R.
 N. Y. Univ.
 *Chisholm, David B.
Northeastern Coal Bureau
 *McCarthy, Edmund
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North American Cement Corp.
 Hedley, Paul M.
 O'Donnell & Schmidt
 *O'Donnell, Nell A.
 *Schmidt, William C.
Olin Mathieson Chem. Corp.
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 *Osborn, William H.
Pacific Tin Cons. Corp.
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 *Pate, Paul S.
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 *Bailey, Carroll C.
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 *Forlund, Evar John
 Patino Mines & Enterprises
 *Derlinger, DeWitt C.
 Pennie, Edmonds
 List, James W.
 Penn Gilm Sand Corp.
 Reynolds, George I., Jr.
 Phelps Dodge Corp.
 Dodge, Cleveland E.
 Fenzi, Warren E.
 Hawkins, J. Mills
 Hope, John
 Masten, John E.
 Munro, George B.
 Page, Robert G.
 Ross, James C.
 Stuart, Herbert Z.
 Winship, Charles H., Jr.
Philip Bros. Ore Corp.
 Braman, Bernard A.
 Poirier, McLane Corp.
 Christy, Harold J.
 Pogson, Pouliot & Co.
 *Peeloub, Maurice E.
Ramsayer & Miller
 Kienzle, Fred
Revere Copper & Brass Inc.
 Collins, John J.
 R. N. Corporation
 *Moklebust, Olav
Roger Smith Hotels Corp.
 deLima, Oscar A.

Round Mt. Gold Dredging Corp.
 Ashley, J. H.
 Russell Bryan & Assoc.
 *Bryan, Russell R., Jr.
St. Joseph Lead Co.
 Bridgen, George I.
 Cameron, Francis
 Colvin, James G.
 Donald, Norman H., Jr.
 Fletcher, Andrew
 Isbell, W. T.
 Mechin, R. J.
 Ramsey, Robert H.
 Riggs, Lawrason, III
Samin Corp.
 Hochschild, Mauricio
 Sanderson & Porter
 *Vermilye, Floyd D.
 M. A. Schapiro & Co. Inc.
 Schapiro, Morris A.
 Scudder, Stevens & Clark
 Quint, George
***Eakland, Edward H., Jr.**
 Separations Engrg. Corp.
 *Jarman, G. Wallace
Shahmoon Ind.
 Rieger, James C.
Shattuck Denn Min. Corp.
 Appelin, Carl W.
 *Kentro, Dan M.
 LaMond, Norman E.
 Pierce, Jack C.
Singmaster & Breyer
 Brunner, John J.
 *Chelmnicki, Roman
 *Russell, John C.
 *Singmaster, James A.
 Singstad & Baillie
 *Singstad, Ole
Skidmore, Owings & Merrill
 Smith, John C.
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 Andersen, Axel Brix
 Deleuran, Henry
 Ellis, Charles B.
 Macaruda, Donald B.
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So. American Gold & Plat. Co.
 Barber, Leon F.
 Breeding, William H.
 *Brownbill, Herman F.
 O'Neill, Patrick H.
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Standard Ore & Alloys Corp.
 Kaplan, Stuart R.
 Stein Hall & Co. Inc.
 Levine, Nathan M.
 Stora Kopparbergs Corp.
 Dormsjö, Ture O.
 Stricken & Henning Res.
 *Stricker, Adam K., Jr.
 Nat'l Lead Co., Tam Div.
 *Jacobs, Chas. W. F.
Tata Inc.
 Warren, Edwin T.
Technical Equip. Corp.
 *Jacobson, Moses
Tekera Int'l. Inc.
 *Lambur, Charles H.
 C. Tennant Sons & Co.
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 McIntosh, Frederick R.
 Norem, Gordon L.
Tenn. Corp.
 Westlake, Emory H.
Texas Gulf Sulphur Co.
 Nelson, Fred M.
 Tippie, Frank E.
 Mollison, R. D.
 Meagher, Edward C.
 Donohoo, H. Yan W.
 Duecker, Werner W.
 Fogarty, Charles F.
Thor Power Tool Co.
 Larabure, Eugenio C.
Time Inc.
 Solow, Herbert
Tompkins Min. Mach. Corp.
 *Tompkins, E. S.
Tungsten Min. Corp.
 *Sweet, James R.
 Long, W. Lansford
Tuthill & Co. Inc.
 Tuthill, Marshall W.
United Holidays Inc.
 Kenna, R. K.
Uris Brothers
 Hayes, Thomas M.
Union Carbide Nuclear Co.
 Riddle, John A.
Union Carbide Ore Co.
 Beal, Wilder
 Brown, William K.
 Buller, Arthur E.
 Cromer, Sylvan
 Frasche, Dean F.
 George, Jack W.
 Kinzel, Augustus B.
 Mahoney, Robert M.
 Mee, Virginia A.
 Meek, Thomas H.

Nelson, Graham A.
 Nicholson, Hugh P.
 Pullen, Leslie W.
 Rove, Olaf N.
 Shanklin, Fred L.
 Shekarchi, Ebrahim
 Shoemaker, Robert S.
 Spedden, H. Rush
 Warde, John M.
 Weiss, Edwin M.

U. S. Army
 Coleman, William R., Jr.
 Kravitz, Joseph H.
 Mills, Charles S., Jr.
 *Mozian, Zareh
 Reeves, George E.
 Weigle, David J.

U. S. Navy
 *McGavock, Cecil B., Jr.
 Schottler, George R.

U.S.O.M. to Iran
 Wright, Wilford S.

U. S. Rubber International
 *Daly, Robert E.

U. S. Smelt & Refin. & Min. Co.

Jenkins, Warren J.
U. S. Steel Corp.
 UAC Div.
 Kivert, Joseph A.
 *Mehrhoff, William R.
 Rugen, Chester D.
 Schmidt, Lawrence D.
 Tresouthick, Stewart W.

U. S. Steel Export Co.
 MacKenzie, J. T.
U. S. Treasury Dept.

Wojly, Conrad A.
 Vaca Oil Co. Inc.
 Stahle, Carl
Vanadium Corp. of America
 Grant, Lester E.

Vitralic Co. America
 Horlick, Alex
Vitro Chemical Co.
 Hall, William B.
 Vitro Engrg. Co.

Checkley, David M.
 Petrie, Henry J.
Vitro Mineral Co.
 Hotchkiss, Eugene B.

Louis Watjen Inc.
 Orchard, Carlos A.
 Webster Mfg. Inc.
 DiClement, Roland V.
Westfield Minerals

*Tower, George Warren
Western Gold & Uranium
 *Prior, Charles E.
 Reese, Lemuel V.

Western Knapp Engrg. Co.
 *Lassiter, Richard T.
 Frohling, Edward S.
Western Machinery Co.
 Cogswell, H. K.
Whitehead Bros. Co.

Maddison, Robert J.
 Whitney & Kemmerer
 Kemmerer, Mahlon S.

A. R. Wilsey & Sons Inc.
 Bonardi, Bruce B.

No Data Supplied
 Alexis, Jos. H. V.
 *Atwater, R. M., Jr.

*Ayer, Frank A.
 *Bancroft, Howland
 Banks, Harold P.
 Baragwanath, John G.
 Bell, Gordon K., Jr.

Bereslavsky, E. V.
 Berman, Byrd L.
 Bernard, Clinton
 Bliss, Lyman A.
 Blonsky, George B.

Bonardi, Jack P.
 Brassert, Herman A.
 Butler, Leonor F.
 *Caceres, Manuel C.

Channing, R. H.
 Chapin, C. Merrill
 Chilcott, Julian P.
 Conroy, Barry W., Jr.

Cornwell, Irwin H.
 Corry, Andrew V.
 Coulam, John R.
 Craig, Colgate, Jr.
 Cronau, Egmont W.

*Daume, Lloyd E.
 Dickenson, E. H.
 *Dobson, Chris G.
 Doner, George B.
 Easley, Albert Geo.

Eddine, George E.
 Eddy, Emerson W.
 Fajardo, R. Eduardo
 Finel, Raymond F.
 Fischer, Arthur H.
 *Fitzgerald, Wm. B.
 *Freakes, Archibald W. T.
 Fundenberg, L. M.
 Gluck, Samuel E.
 Grant, Wheadon M.
 Haley, Dennis F.
 Hayden, William M.
 Heiko, Bernard
 Hoffman, Arnold
 Hoffman, Robert D.
 Hoffmann, Harry E.

New York-OHIO

Holland, John S.	OYSTER BAY	SOUTH NYACK	WEST NYACK	KINGS MOUNTAIN
Hudson, Percy K.	American Mines, Inc.	No Data Supplied	N. Y. Trap Rock Corp.	Foote Mineral Co.
Hansen, Arthur	*Labounsky, Alex	*Kay, Fred D.	Dow, Melvin C.	Albrecht, Theodore J.
Jensen, R. M.	PALISADES	STAR LAKE	McDonough, Donald W.	Goter, Edwin R.
Lane, J. F.	Lamont Geological Observatory	Jones & Laughlin Steel Corp.	Mead, Robert E.	Hall, Robert
Lawson, A. W.	Van Der Hoeven, F. G.	Djuvik, Carl	Schwellenbach, Henry J.	Johnson, Neil O.
Leighton, John	PELHAM	Fleck, R. Grant	WILLISTON PARK	Kesler, Thomas L.
Littlefield, H. B.	No Data Supplied	Lund, Lawrence H.	No Data Supplied	*Lancaster, Paul A.
Lundquist, A. D.	*Baker, Raymond F.	Peterson, Arthur F., Jr.	Williams, J. B., Jr.	LINCOLNTON
Lynch, J. J., S. J.	PITTSFORD	West, Frederick J.	WILLSBORO	Basic Atomics, Inc.
Lynch, W. W.	No Data Supplied	*Vickers, William A.	No Data Supplied	Wingo, Robert W.
*MacLean, L. Mansell	Ailing, H. L.	No Data Supplied	Hall, Arthur L.	Lincoln Nat. Conc. Corp.
MacLetchie, J. G., Jr.	PLANDOME	Rowand, H. C.	WOODMERE	Clark, Walter
Mann, J. R. C.	No Data Supplied	Taylor, M. J.	Integrated Mica Corp.	MURPHY
Mark, David L.	*Baker, Raymond F.	STANISLAUS ISLAND	*Heyman, Moses D.	The Hitchcock Corp.
Meltzer, Samuel	PITTSFORD	No Data Supplied	YONKERS	Bourne, Francis C.
Metcalfe, June M.	No Data Supplied	*Dickson, Robert H.	No Data Supplied	Bruner, Foster W.
*Millar, W. B.	Ailing, H. L.	Wellnitz, Anna M.	Cawley, Nevil B.	E. C. Van Horn Assocs.
Miller, Arnold H.	PLANDOME	STONY BROOK	Ferber, Ronald	*Van Horn, Earl C.
Mittendorf, C. O.	No Data Supplied	No Data Supplied	*Moyd, Pauline	HAILEY
Moore, Wm. A.	*Marty, Edgar O.	MacKenzie, Thos. A.	*Moyd, Louis	N. C. State Museum
Moscato, Richard	Feeley, James L.	SUFFERN	International Business	Davis, Harry T.
Moulton, H. G.	Zeckhausen, P. W.	No Data Supplied	Machine Corporation	*Miller, E. J., Jr.
Najarian, Greg	PORT CHESTER	Sargent, Robert E.	Franklin, James W.	Parker, John M., III
Neu, Hugo	No Data Supplied	SYRACUSE	No Data Supplied	WILMINGTON
Notman, Arthur	Matson, Robin W.	Allied Chemical Corporation	Cawley, Nevil B.	Atlantic Coast Line R.R.
Ocha, Felix	PORT HENRY	(Solvay Process Div.)	Ferber, Ronald	Councill, Richard J.
Okun, David	No Data Supplied	Boggs, William E.	*Moyd, Pauline	LeGrand, John R.
Pascual, S. J.	Matson, Robin W.	Syracuse Univ.	*Robie, Edward H.	Llewellyn, Clement M., Jr.
Payne, William D.	PORT HENRY	*Chute, Newton E.	NORTH CAROLINA	WINSTON
Perlitz, Charles O.	No Data Supplied	Coon, Richard F.	ASHE CITY	W. E. Graham & Son
*Peters, Chester M. F.	Matson, Robin W.	No Data Supplied	Seminole Rock & Sand Co.	Hedrick, H. Dermont
Pierce, S. S.	POUGHKEEPSIE	Domenico, Patrick A.	Lansiter, Robert G.	WINSTON SALEM
Pitschi, A. T.	No Data Supplied	Newton, Robert S.	ASHEVILLE	R. J. Reynolds Co.
Prentiss, Edmund A.	Gross, Gerardo W.	TAHAWUS	Southeastern Dia. Drilling Co.	*Richmond, Roland M.
Prochazka, G. A., Jr.	Klemitz, Leroy E.	National Lead Co.	Jennings, J. B., Jr.	No Data Supplied
Railing, Lewis I.	HETSOF	Begor, Charles R.	N. C. State College	Sharp, Harold H.
Rontz, Dietrich H.	Int'l Salt Co.	Chapman, Walter M.	*McDaniel, William T.	Laine, Robert B.
Ryan, Rhys Evans	Bush, Lewis P.	Dellinger, Brower	No. Carolina Min.	Jeffers, Carl M., Jr.
Ryd, Erik	Martin, Stanley	Gross, Stanford O.	*Wright, Thomas J.	Robinson, Clyde H.
Saltzman, David	Truax, Chester N., Jr.	Hall, John G.	BESSEMER CITY	Meyer, Harold D.
Scheck, Friedrich A.	No Data Supplied	Hatch, Dexter C.	Lithium Corp. of Amer. Inc.	Maddox, Joseph E., Jr.
Schider, Rudolph	*Butterfield, Howard M.	Heinrich, Robert	McClure, Joseph N.	Biggs, William F.
Schmidl, Bill W.	Goetz, Reuben G.	Morris, Paul E.	TONAWANDA	Sherertz, Joe R.
Schreiber, Fred	REXFORD	No Data Supplied	No Data Supplied	*Atkins, William R.
Schuberth, Chris J.	Nat. Res. Loc. Corp.	Kingman, Robt. I.	TONAWANDA	*Wood, Alexander H.
Schweitzer, H. C.	*Merrill, Delbert J.	TAHAWUS	Hassett Mining Co.	Eckman, M. A.
*Searls, Carroll	ROCHESTER	No Data Supplied	*Adair, Ralph B.	Gardner, Richard A.
Sharp, Ernest H.	Univ. of Rochester	Sulecki, John S. L.	CHAPEL HILL	Hammie, John V.
Shea, Vincent H.	Coch, Nicholas K.	TROY	Univ. of N. C.	Ong, J. N.
Sheffield, John R.	ROME	Rensselaer Polytech. Inst.	*Mann, Virgil I.	Stuckey, Jasper L.
Sibley, A. H.	No Data Supplied	*Dunn, James R.	Michalek, Daniel D.	Woodbury, William D.
Smirov, Leonid	Goetz, Reuben G.	Roland F. Beers, Inc.	CHARLOTTE	Phillips, Rev. A.
Smith, H. DeWitt	REXFORD	*Beers, Roland F.	Hewitt-Robins, Inc.	Mauney, Robert E.
Spratt, William H.	Nat. Res. Loc. Corp.	No Data Supplied	Brown, Gene	McMurray, L. L.
Tenafy, Tonitcho	*Merrill, Delbert J.	McCarthy, Peter F.	Montgomery, T. James	*Butler, Howard N.
Tilson, S.	ROCHESTER	TONAWANDA	DURHAM	*Gillis, Julius H.
Tucker, E. H.	Univ. of Rochester	No Data Supplied	Duke Univ.	Hager, Phipps A.
*Turner, Scott	Coch, Nicholas K.	Sulecki, John S. L.	*Berry, E. Willard	Hope, R. C.
Vance, Charles A.	ROME	TROY	Heron, S. Duncan, Jr.	Young, Rawley L.
Vander Laan, Martin	No Data Supplied	Chicago Pneumatic Tool Co.	Johnson, Walter L.	NORTH DAKOTA
Walker, Byron G.	Crouch, Thomas S.	Hallett, Alfred F., Jr.	FAYETTEVILLE	GRAND FORKS
Walz, Andrew	RYE	Tucker, Mana L.	No Data Supplied	Univ. of North Dakota
Weaver, W. M., Jr.	No Data Supplied	Eastern Rock Products, Inc.	*Coffman, Peyton R.	*Cooley, Albert M.
Weems, Frank T.	Park, John F.	Owens, John V.	FRANKLIN	*Diamant, John H.
Weldon, Joseph M.	Petersen, L.	No Data Supplied	Allman Cove Min.	Kohanowski, N. N.
Wensley, Roger Lytle	SCARSDALE	Lear, E. B.	Fouts, Roy H.	Koth, Arthur
West, J. Frank	Kenite Corp.	WANAKENA	FT. BRAGG	WILLISTON
*Wilson, Philip D.	*Frankenhoff, Charles A.	No Data Supplied	No Data Supplied	Great Northern Railway Co.
Wingate, Henry S.	No Data Supplied	Ellingsen, Robert L.	Williams, Stuart H.	Reed, Henry E., Jr.
Wise, Alfred L.	Garretson, Mary W.	WANTAUUGH	GOLDSBORO	JAMESTON
Wraith, W., Jr.	*Kursell, Herbert A.	No Data Supplied	No Data Supplied	No. Central Engineers
*Wysor, Davidson C.	SCHEECTADY	Watkins Glen	Miller, Chester E.	Andersen, R. Douglas
Yomtov, Joseph	Alco Products, Inc.	Int'l Salt Co. Inc.	GREENEBOURG	Core Lab. Inc.
Zavolko, Basil B.	*Foley, Dennis D.	Wrighton, Richard W.	Tidewater Supply Co.	Evitt, Russell D.
NIAGARA FALLS		*Murphy, Jeremiah F.	Ferrall, James C.	No Data Supplied
The Carborundum Co.		General Electric Co.	Garrison, Charles H.	Bell, Gordon L.
Anthes, Lester B.		Moore, Robert B.	Tungsten Mining Corp.	Duncan, Joseph R.
Baumann, Henry N.		Gen. Elec. Res. Labs.	Kendrick, William L.	Burr, Alex C.
*Moran, Paul W. F. J.		Charles, Richard J.	Malcolm, J. B.	OHIO
Strategic-Udy Processes, Inc.		SKANEATELES	*Millspaugh, Frank W.	B. F. Goodrich
Donaldson, John W.		No Data Supplied	Szykiewski, A. M.	Traxler, E. R.
*Magyar, William B.		Spalding, Joseph W.	WEBSTER	Goodyear Tire & Rubber Co.
*Udy, Murray C.		No Data Supplied	No Data Supplied	Thornton, James L.
Union Carbide Metals Co.		Conover, A. Edward	WEST BRENTWOOD	Robinson Clay Prod. Co.
Carpenter, Robert D.		No Data Supplied	No Data Supplied	Sutherland, Clark
Erasmus, H. de Wet		No Data Supplied	Ipse, A. O.	ALLIANCE
Evans, Fred L.		No Data Supplied	Appalachian Sulphides	No Data Supplied
Offenhauer, Charles M.		No Data Supplied	Nameth, Stephen J.	AMHERST
Sanden, Robert T.		No Data Supplied	No Data Supplied	Zukowski, Richard E.
No Data Supplied		No Data Supplied	No Data Supplied	
Doerr, John P., Jr.		No Data Supplied	No Data Supplied	
Papachiarambus, H. G.		No Data Supplied	No Data Supplied	
NORTH CHEER		No Data Supplied	No Data Supplied	
Barton Mines Corp.		No Data Supplied	No Data Supplied	
Barton, Chas. R., Jr.		No Data Supplied	No Data Supplied	
Barton, H. Hudson		No Data Supplied	No Data Supplied	
*Vogel, Herman H.		No Data Supplied	No Data Supplied	
NORTH TARRYTOWN		No Data Supplied	No Data Supplied	
No Data Supplied		No Data Supplied	No Data Supplied	
Pearce, Hubert A.		No Data Supplied	No Data Supplied	
OAKFIELD		No Data Supplied	No Data Supplied	
U. S. Gypsum Co.		No Data Supplied	No Data Supplied	
Miller, George T.		No Data Supplied	No Data Supplied	
SOCIETY OF MINING ENGINEERS OF AIME		No Data Supplied	No Data Supplied	

Ohio-Oklahoma

ASHLAND

No Data Supplied
Foy, C. Benjamin

BARTON

Babcock & Wilcox Co.
Pearson, Leonard
Shewmon, Daniel C.
Wilcoxson, Leslie S.
Columbia Southern Chem.
Corp.
Murray, Robert K.
No Data Supplied
Manderfield, Bernard

BEDFORD

Ferro Corp.
Fuchsman, Charles H.
S. K. Wellman Co.
Wellman, Samuel K.

BOWLING GREEN

No Data Supplied
Thoma, John A.

CADIZ

Hanna Coal Co.
Bearce, Wendell E.
Bradford, Thomas P.
Connelly, William P.
Delloma, Cecil M.
Gibson, O. Clyde
Hyslop, James
Reilly, James D.
Schneider, George G.

CAMBRIDGE

Vanadium Corp. of Amer.
Rathmann, Heinrich W.
Rasmussen, Robert T. C.
Roman, Byron S.
No Data Supplied
Kuhn, Robert S.

CANFIELD

Amer. Fire Clay & Prod. Co.
Day, Britton, T.

CANTON

Amer. Mine Door Co.
Gurney, Glenn D.

CHAGRIN FALLS

No Data Supplied
Bigler, W. P.

CHESTER

Ohio River Collieries Co.
Gentile, Anthony

CHILLICOTHE

Basic Construction Mts.
Neikirk, Charles W.

CINCINNATI

Cabin Creek Coal Sales Co.
Nichols, Walter B.
Chem. & Ind'l Corp.
O'Hara, B. Marvel
Consolidation Coal Co.
Clayton, Carl W.
Continental Min. Proc. Corp.
Hauck, Frederick A.
Energy Industries, Inc.
Ruston, Norman A.
Ingersoll-Rand Co.
Cooper, Sidney D.
Jewell Ridge Coal Sales Co., Inc.
Robertson, Alex E.
Nat. Lead Co. of Ohio
Mead, Joseph C.
Chan Taylor Sons Co.
Maupin, Addison
Truax-Traer Coal Co.
Patton, M. L.
No Data Supplied
Nice, John A.
Stillwell, S.
Tobey, Julian E.

CLEVELAND

Amer. Iron Ore Assoc.
Johnson, Hugo E.
Basic, Inc.
Casey, Joseph A.
Eells, Howard P., Jr.
Martin, Conrad
Muller, Max
Pearson, Edward P.
Shurtz, Robert F.
Bigelow-Liptak Corp.
MacDonald, William T.
Booz-Allen & Hamilton
Dougherty, Ralph E., Jr.

Butler Bros.

Butler, Patrick
Chesapeake & Ohio Railway
Haessler, Edward W.
Toothman, Fred R.
Cleveland-Cliffs Iron Co.
*Foulden, John J.
Hodister, John B., Jr.
McAfee, Alexander
*Pakkala, W. Al
Sterling, Walter A.
Westwater, James S.
Consolidated Coal Co.
Ireland, R. Livingston
Diamond Alkali Co.
*Lefond, Stanley J.
Welahans, Lewis T.
H. K. Ferguson Co.
Heller, Edward L.
Glidden Co.
*Landers, William H.
M. A. Hanna Co.
Anderson, Robert F.
Bustard, Jack W.
Chace, Frederic M.
Crist, Robert B.
Gustafson, John K.
Lyon, George W.
Phillips, Peter M.
Scheiblinger, A. K.
Vedenaky, D. N.
*Walker, Alfred E.
Webber, Benj. N.
Whitney, Richard W.
Harshaw Chem. Co.
Hay, John O.
Pine, Paul R.
Hydraulic Press Brick
Ducey, Robert K.
Independent Explosive Co.
Weitz, John H.
Int'l Nickel Co.
Neemets, John C.
Int'l Salt Co.
Bleimester, Wm. C.
*Wade, Robert W.
Lorain Coal & Dock Co.
Williams, Lloyd C.
Le Roi Div., Wabco
Feucht, Jacob E.
Lincoln Elect. Co.
Todd, Arthur W.
The Master Bldg. Co.
King, John C.
McDowell Co.
Ban, Thomas E.
Doversberger, V. Charles
Ferren, R. O.
McDowell, Robert C.
Rowen, Allen R.
Rowen, Harold E.
Thompson, Chas. D.
Violetta, Donald C.
McGraw-Hill, Pubs. Co.
Coash, Carl J.
Arthur G. McKee Co.
Cox, Merrill
*Greenwald, Richard B.
*Haven, Wm. A.
*Morgan, Milton F.
Meissner Portland Cement Co.
Smith, Robert L.
M & O Coal Co.
Ray, Harmon C.
Nat'l Malieable & Steel
Castings
Smith, Herbert H.
Woody, Fred C.
Yearley, Bernard C.
No. Amer. Cos. Corp.
Brockwell, James A., Jr.
Brockwell, Okley B.
Morris, Robert N.
Oglebay Norton Co.
Dadd, Melvin W.
Fetzer, Wallace G.
Hamilton, W. D.
*Martin, Henry K.
Sloan, Edward W., Jr.
*Smith, Frank J.
Pickards Mather & Co.
Arms, Charles S.
Carey, Robert S.
Ford, Allen H.
Hassett, John S.
Jackson, Herbert C.
Mapes, Edwin J.
Reliance Elect. & Engr. Co.
Hugus, Charles E., Jr.
Republic Steel Corp.
Allen, George W.
Babcock, Donald E.
Chernosky, Frank J.
Coghill, William H.
Eggleson, Edward R.
Fitzhugh, Edward F., Jr.
*Hazel, John J.
Howell, Sidney C.
Kuperus, Cornelius
McVicker, Joseph R.
Miller, Samuel A.
Muthig, Robert W.
Reed, William A.
Slobey, Robert J.
Walburn, Benjamin R.
Sarver Coal Co.
Miller, Armon J.

Seaford Min. & Ore Co.

McClurg, John
Sylvester & Co.
*Sylvester, George R.
Technical Services, Inc.
Gramp, Otto G.
Textron's Coal Inspection Service
*Textor, Ralph B.
W. S. Tyler Co.
Cockrell, Edwin E.
Irwin, David Mciae
Kaufmann, Vincent A.
Kuenhold, Ned I.
Norlin, John M.
Reed, Albert E.
Valley Camp Coal Co.
Ewig, Harry T.
Richey, Herbert S.
Wellman, Engr.
*Ludwig, Carl
No Data Supplied
Andrews, J. V.
Craig, John J.
Dewey, Charles H.
English, Alan
Jenkins, J. M.
Montgomery, Chas. R.
Morris, J. Howard
Taylor, Harry S.
Weber, H. P.
*Wyman, Clifton L.

COLUMBUS

Battelle Memorial Inst.
Anderson, Richard J.
Brison, Robert J.
Carmichael, Ronald L.
Crout, John S.
Jacobs, Daniel A.
Langston, Benny
Lund, Richard J.
Minton, David C., Jr.
Richardson, A. C.
Russell, H. W.
Schatz, Raymond W.
Shea, James F.
Smith, William Lee
Sullivan, John D.
Tangel, Oscar F.
Weaver, Adam L.
Bituminous Coal Research, Inc.
du Breuil, Felix L.
*Garvey, James R.
*Grace, Robert J.
Saltsman, Robert D.
Updegraff, Loy A.
Commercial Fuel Co.
Clemens, John I.
Davon, Inc.
Patton, Robert M.
A. H. Dierker & Assoc.
*Dierker, Arthur H.
Gleaves Fuel Co.
*Gleaves, Clifton B.
Industrial Nucleonics Corp.
Reider, James E.
Jeffrey Mfg. Co.
Flint, James A.
Fulford, J. H.
Petersen, M. S.
Wilson, John E. M.
Consolidation Coal Co.
Lee, Arthur L.
National Elect. Coll Co.
Hatfield, D. Wendell
Kirby, Fred W.
*Price, Bailey E.
Ohio State Univ.
*Frantz, Robert L.
Lamey, Carl A.
Lucas, J. Richard
McCaughay, Wm. J.
*Mueller, Wm. A.
Ohio State Highway Dept.
*Tucker, LeRoy M.
Ohio Reclamation Assn.
Cook, Larry
Princess Coal Sales Co.
*Stilwell, R. Frank
U.S. Geolog. Survey
Roeske, Rodney H.
Schopf, James M.
Clyde Williams & Co.
*Williams, Clyde E.
W. W. Williams Co.
Bonta, Earl C.
No Data Supplied
Abbott, Raymond C.
Bird, Byron M.
Elizsey, Vernon W.
Reilly, G. A.
Root, Stephen G.
Tyson, J. T.
Warner, Max M.

COSHOCOTON

Ebony Coal's, Inc.
Ungurean, Constantine C.

CUYOGOGA FALLS

No Data Supplied
Nast, P. H.
Walter, A. B.

ELYRIA

Concrete Masonry Corp.
*Goudvis, Theodore L.

FAIRPORT HARBOR

Morton Salt Co.
Ryland, Robert R.

FINDLAY

Differential Steel Car Co.
Flowers, H. Fort
*Flowers, Robt. D.
Hughes, Shelly G.

FOSTORIA

Basic, Inc.
Addis, Edwin M.
Hughey, Vaughn V.
Janofsi, Stephen E.

FREMONT

No Data Supplied
Morris, Peter A.

GALENA

No Data Supplied
Smith, Frank G.

HEIGHTS

No Data Supplied
Gunning, Samuel D.

HILLSBORO

Davon, Inc.
Bowman, Richard S.

JACKSON

No Data Supplied
Bailey, Arthur L.

LAKWOOD

No Data Supplied
Johnston, V. D.
*Purdy, Gregory P.

LEETONIA

Thermocel Co.
Bertelsen, Robt. C.

LOWELLVILLE

Carbon LimeStone Co.
Chisholm, Robert H.

MANSFIELD

Ohio Brass Co.
Benson, Kenneth
Sanford, Justin H.

MARBLEHEAD

No Data Supplied
Almes, Marion C.

MARIION

Mariion Power Shovel Co.
*Boulter, George W.
Busick, Adrien F., Jr.
Cornell, Maurice V.
McDaniel, Wm. R.
Mosley, Lafayette C.

MARIETTA

Pattin Mfg. Co.
Dempsey, Jack B.
Marietta College
*Freeland, Jean

MIDDLETON

Armco Steel Corp.
Connor, Charles W.
Cumpston, George S. W.
*Enochs, David J.
Olt, T. F.

NELSONVILLE

No Data Supplied
Ong, Philip H.

NEWARK

River Gas Co.
Rhodes, Richard L., Jr.

OLMSTED FALLS

No Data Supplied
*Ives, Lee E.

PAINESVILLE

Morton Salt Co.
*Ganong, Russell G.

No Data Supplied
Richner, Don R.

SAINT CLAIRSVILLE

B.B.R. Drilling Co.
*Balcar, Frank A.
No Data Supplied
Sullivan, David L.

SHAKER HEIGHTS

No Data Supplied
Miskell, Ford
Prendergast, Jas.
Taber, Robert W.

SIDNEY

Le Ro Div., Westinghouse
Air Brake Co.
Feucht, Albert
Meyer, Andrew

SPRINGFIELD

Bauer Bros. Co.
*Wright, J. Howard

STUBENVILLE

McMasters, Kerr & Wineman
Jenks, E. H.

TOLEDO

Owens Illinois Glass Co.
Richards, R. S.

Du Pont
Miller, Emory W.
U.S. Army
Abrams, Col. B. B.

UNIVERSITY CENTER

No Data Supplied
Liggett, R. P.

WELLINGTON

Wedge Wire Corp.
Harper, Robert J.
*Pearsall, Robert P., Jr.

WELLSVILLE

H. K. Porter Co., Inc.

WRIGHT PATTERSON AFB

U.S. Air Force
*Miatech, Gerald J.

YOUNGSTOWN

Commercial Shearing & Stamping Co.
*Siegrist, Ralph S.
Youngstown Sheet & Tube Co.
Braden, Orrin S.
Bremner, Robert P.
Dicks, Sheldon J.
No Data Supplied
*Forman, P. G.

ZANESVILLE

Ayers Mineral Co.
Sawyer, Edward C.
Central Silica Co.
Lincoln, Richard V. B.
Columbia-So. Chem. Corp.
Farst, Walter K.
Petty, Raymond E.
No Data Supplied
Coulson, Frank

OKLAHOMA

BARTLESVILLE

Phillips Petr. Co.
Walls, William S.
U.S. Bureau of Mines
Knox, Clinton C.
Netzeband, F. F.
Sanford, Robert S.
No Data Supplied
Holmes, C. N.
McElvenny, L. T.

CARDIN

Eagle Picher Co.
Cuddeback, F. J.
*Huddleston, Melvin
Moran, Ernest
Wetherell, Lloyd E.

ENID

No Data Supplied
Silver, Edward D.

FORT SILL

U.S. Army Missile School
Winter, Walter

Oklahoma-Pennsylvania

BETHEL PARK

No Data Supplied
 Gent, L. D., Jr.
 *Paulick, Paul R.
 Ruttle, Eugene T.

BETHLEHEM

Bethlehem Steel Co.
 Adair, George L.
 Biemesderfer, George K.
 Cummings, William S.
 Entrekkin, Paul B.
 Foster, James C.
 Fox, Sidney V.
 Fraser, Donald M.
 Guider, James W.
 Hitzrot, Henry W., Jr.
 Hole, Gilbert L.
 Howell, Edgar H.
 Kaufman, August T., Jr.
 Keeler, John Arthur
 Lake, Simon, III
 Leach, Edward P.
 Limons, Robert A.
 Lyons, Daniel S.
 Mancke, Edgar B.
 McIlwain, Hugh T.
 Neff, Melvin A.
 Nicholson, Bruce J.
 Peterson, Arthur F.
 Seaman, Lawrence
 Stor, F. M.
 Tebelman, Charles G., Jr.
 Telfair, Peter
 Van Nys, Francis
 Ward, Stanley A.
 Lehigh Coal & Navigation Co.
 Dodson, John E.
 Lehigh Navigation Dodson
 Co.

Frahle, Foster F.
 Lehigh University
 "Bruce, Arthur W.
 *Gallagher, Robert T.
 "Gault, H. Richard
 Morris, George C.
 No Data Supplied
 Branda, Richard R.
 Cherkis, John J.
 Dick, Charles J.
 Fretz, A. Henry
 Frith, D. L.
 Gallagher, R. T., III
 Jablonki, J. P.
 Jacobs, Robert
 Rankin, W. A.
 Waite, Earle C.
 Warriner, Jesse B.
 Weicker, Raymond V.

BLAISBILLE

North American Gear Co.
 *Duchnowski, Henry E.
 *Graff, Paul W.

BOYERTOWN

Kawecki Chemical Co.
 Kawecki, Henry C.

BRACKENRIDGE

Allegheny Ludlum Steel Co.
 Hilliard, Glenn E.

BRAEBURN

Braeburn Alloy Steel
 Schuck, Charles W.

BRIDGEPORT

Bethlehem Limestone Co.
 Ellington, Thomas S.
 *Jones, Thomas H., Jr.
 Leedecker, Earl K.

BRIDGEVILLE

No Data Supplied
 Talman, Woods G.

BROCKWAY

Brockway Glass Co.
 *Locotos, Frank M.
 Robertson, Leon F.

BRYN MAWR

Bryn Mawr College
 *Watson, Edward H.

BUTLER

Ferrosil Process Corp.
 Rath, Robert A.
 Heckett Engr. Co.
 Jones, W. K.

CALIFORNIA

Jones & Laughlin Steel Corp.
 *Hess, William E.
 Howe, Donald C.
 Reilly, J. J.

HENRYETTA

Ben Hur Coal Co.
 *Taylor, Gene

McALESTER

Lone Star Steel Co.
 *Cameron, Campbell R.
 Curry, Burrell L.
 *Padgett, Ward C.
 U.S. Geol. Surv.
 Dinamore, Alex M.

MIAMI

The Eagle-Picher Co.
 Brockie, Douglas C.
 Dale, Claude O.
 Hare, Edward H., Jr.
 *Rockwell, Orson A.
 U.S. Geol. Surv.
 Gordon, Lawrence E.
 No Data Supplied
 Bailey, Andrew V.

MUSKOGEE

H. G. S. Anderson & Sons
 *Anderson, Hector G. S.
 U.S. Bur. of Indian Affairs
 Coulter, Don M.

NORMAN

University of Okla.
 *Ham, William E.

OKLAHOMA CITY

Kerr-McGee Oil Ind.
 Corn, Russell M.
 Matteson, Vernon L.
 McGee, Dean A.
 *Vizcaino, Henry P.
 Kermac Nuclear Fuels Corp.
 Cobb, George H.

OKMULGEE

No Data Supplied
 Cole, John T.

PICHEE

Landis Steel Co.
 Landis, Miles B.
 Quapaw Co.
 Childress, Harold L.

PONCA CITY

Fenix & Scissom, Inc.
 Kuklis, Andrew

POTEAU

LeFiore County Gas & Elec.
 Co.
 Orr, James F.
 No Data Supplied
 Haley, Ted D.

PHYR

Oklahoma Cement Co.
 *Anderson, A. J.
 No Data Supplied
 Brown, John R.

SOUTHARD

No Data Supplied
 Woods, Samuel W.

TULSA

Amerada Petr. Corp.
 Millikan, C. V.
 Blackwell Oil & Gas Co.
 Schultz, Paul R., Jr.
 Fenix & Scissom, Inc.
 *Scharf, Fred
 Gardner-Denver Co.
 Caldwell, Robt. G.
 Kewanee Oil Co.
 Parker, Norbert A.
 Pan Amer. Pet. Corp.
 Clark, Joseph B.
 Friedman, Gerald M.
 *Reynolds, Karl W.
 Penn Royalty Co.
 Baltosser, Robt. W.
 Baugh, Billy G.
 Seismograph Service Corp.
 Bunker, John G.
 U.S. Geol. Surv.
 Johnson, Edward L.
 No Data Supplied
 Faxon, Richard D.
 *Huffman, Joe D.
 Richards, Raymond
 Reed, James E.

WEATHERFORD

No Data Supplied
 Geffken, John

OREGON

ALRANY
 U.S. Bureau of Mines
 Banning, Lloyd H.
 *Bishop, Ottey M.
 Gallagher, Alton E. J.
 Hess, Harold D.
 Kauffman, A. J., Jr.
 Town, Joseph W.
 No Data Supplied
 Brown, Lawrence L.

BAKER

Chemical Lime Co.
 Thomas, Ned
 State Dept. Geol. & Min. Ind.
 Brooks, Howard C.
 Wagner, Norman S.

BEND

No Data Supplied
 Langstaff, Jon T.

CENTRAL POINT

No Data Supplied
 Shepard, S. Y., Jr.

COLTON

No Data Supplied
 Hill, David

COQUILLE

No Data Supplied
 Halter, Rodney D.

CORVALLIS

Boeing Airplane Co.
 *Greene, Frank F.
 Helena Mines
 Watkins, Kenneth O.
 Oregon State College
 *Allison, Ira S.
 Caldwell, William E.
 Koch, George S., Sr.
 Lauritzen, Don A.
 No Data Supplied
 Carnahan, Gary L.
 Gallagher, J. H.
 Hartung, L. F., Jr.
 Wilkinson, W. D.

COTTAGE GROVE

Lane Minerals, Inc.
 Barton, Harold E. L.

EUGENE

Univ. of Oregon
 *Staples, Lloyd W.
 No Data Supplied
 Fifer, H. Clay
 Harlow, Jean S.

FOREST GROVE

Fremont Mining Co.
 *Blair, Frank H., Jr.
 *McKee, John P.

GRANTS PASS

Oregon Dept. Geol. & Min.
 Ind.
 Ramp, Lenin
 No Data Supplied
 Robertson, Wm. S.

HILLSBORO

E. A. Messer & Assoc., Inc.
 Messer, Ernest A.

JACKSONVILLE

No Data Supplied
 Maddox, Terry

KLAMATH FALLS

U.S. Bureau of Reclamation
 Renning, John A.

LAKEVIEW

Lakeview Mining Co.
 Wilson, Thomas L.
 No Data Supplied
 Kutz, Kenneth J.

MEDFORD

No Data Supplied
 *Ingle, Hugh C.

NORTH BEND

No Data Supplied
 Forrester, Robert S.

NYSSA

No Data Supplied
 Lienkaemper, J. A.

PORTLAND

Bethlehem Steel Co.
 Fealy, William A.
 Ivan Bloch & Assoc.
 *Bloch, Ivan
 Electric Steel Foundry Co.
 Haney, Charles E.
 Williamson, R. G.
 Wustrack, O. H.
 Farnham Chem. Co.
 Farnham, Willard
 Gladding McBean & Co.
 Whitney, Eugene H.
 Ingersoll Rand Co.
 Leary, John H.
 Oregon State Dept. of Geol.
 & Min. Ind.

Dole, Hollis M.
 Hoagland, L. L.
 Mason, Ralph S.
 Mathews, Thomas C.
 Schlicker, Herbert G.
 Oregon Steel Mills
 Miller, Keith L.
 Owen-Illinois
 Monher, Pearson T.
 Pacific Carbide & Alloys Co.
 Watson, Thomas J.

Pacific Power & Light
 Dush, Garth A.
 Martin, Robert A.
 Kenneth Poorman Co.
 *Poorman, John M.
 Portland State College

*Allen, John Elliot
 U.S. Army Corps of Engrs.
 *Zwick, Walter H.

U.S. Bureau of Land
 Management

Berlin, Leonard M.
 Hattan, Elton M.
 U.S. Forest Service

Anderson, Colver F.
 No Data Supplied

Anderson, J. R.

Bartell, A. O.

Bird, Robert M.

Donahue, Charles V.

Friedle, F. J.

Gregory, Cecilia D.

*Hines, Pierre R.

Huseby, Juel G.

*Libbey, Fay W.

Orr, James M.

*Richards, Leslie C.

Susie, H. F.

Turner, William J.

RIDDLE

Hanna Nickel Smelting Co.
 Hard, Herbert W.
 Maney, Edward J.
 Mollard, Earl S.
 Stevens, Richard M.

ROGUE RIVER

Bristol Silica Co.
 Bristol, Fayette I.

ROSEBURG

Specialized Parts
 Thurber, H. K., Jr.

SALEM

Oregon State Government
 *Gustafson, Fred D.
 No Data Supplied
 Leonard, Theodore T.

SPRINGFIELD

No Data Supplied
 Mathias, Donald E.

SUMPTER

Buffalo Mine
 Fern, Ed
 Jackson, James P., Jr.
 No Data Supplied
 Woodwell, Arthur H.

TIGARD

No Data Supplied

*Hears, Henry S.

TROUTDALE

Reynolds Metals Co.
 Hall, Robert L.
 Hanson, Richard L.
 *Rice, William L.
 Shoemaker, Henry W.

PENNSYLVANIA

Air Products, Inc.
 *Antaki, Victor M.
 Allentown Portland
 Cement Co.
 Myers, Philip B.

ALLENTOWN

BERWYN

Foot Mineral Co.

Coghlan, David B.

Horst, William E.

*Mao, George W.

Mitchell, David W.

Pennsylvania-Pennsylvania

CALLERY	CONYNGHAM	EBENSBURG	GLENN MILLS
Callery Chemical Co. Toering, Albert J.	No Data Supplied Owens, Harry C.	Bethlehem Mines Corp. Ferguson, Peter A. Reed, Robert Poe, Jr.	The General Crushed Stone Co. Kemery, Harry W.
CAMP HILL	COOPERSBURG	ELDRED	GOODSPRINGS
No Data Supplied Cooper, Edward, Jr.	No Data Supplied Mahood, G. P.	National Powder Co. Pinkey, Leonard A., Sr.	Feng Coal Co. "Riedel, Alfred B.
CANONSBURG	CORAopolis	ELLSWORTH	GREENSBURG
Eastern Gas & Fuel Assoc. Black, Robert J.	Am. Minechem Co. Messer, Leonard	Bethlehem Steel Co. Sprague, Luther S.	Old Republic Ins. "Glance, Arthur S.
CARBONDALE	CORNWALL	No Data Supplied Ward, John D.	GREENSBORO
Cross Perforated Metals Co. Lloyd, Charles J.	Bethlehem-Cornwall Corp. Bernhardt, Joseph Bingham, John P.	ELLWOOD CITY	U. S. Steel Corp. Coe, G. Dale Durfee, John C.
Hendrick Mfg. Co. Colville, K. H., Jr.	Brown, Nathan Eben, C. Frederick	No Data Supplied Morgan, Wm. A.	GREENSBURG
No Data Supplied Blackburn, D. M. Dann, B. C., Jr.	Harmon, Richard C. Lipensky, Milan Neil, Charles R. Perhac, George A.	ELVERSON	Nat'l. Mine Service Co. Schubert, Rudolf R. Jamison Coal Co. Jamison, Will B.
CARLISLE	*Renfrew, Robert T., Jr. Rogich, Donald G. Shale, Sheldon J. Taylor, Charles E., Jr. *Weik, William J. Wheeler, Robert M. White, Frank P.	Rasey, Watson G. II Ericz Mfg. Co. Merwin, Robert F.	South Union Coal Co. Jamison, David S. No Data Supplied Kelley, Jay H.
Carlisle Corp. Dixon, George F., Jr.	CRESSON	ERIE	Gwynedd Valley
CARMICHAELS	No Data Supplied Evans, M. Albert	Gen. Elec. Co. Brauns, John W.	No Data Supplied "Enck, Ernest G.
No Data Supplied Connor, Jack W. Kennon, Jack A. Sharpack, Robert L. Min, Zin	CRUCIBLE	EVANS CITY	HAMILIN
CARNEGIE	Crucible Steel Co. of Am. "Bodorek, Gunther Baseley, Dean W.	Allentown Portland Cement Co. Thomas, Russell C.	No Data Supplied "Gale, Paul B.
S. P. Kinney, Engrs., Inc. "Kinney, S. P.	DALLAS	FAIRLESS HILLS	HANOVER
CATASAUQUA	No Data Supplied Foulke, R. W., Jr. Jennings, F. W.	U. S. Steel Corp. "Webb, William R.	Bethlehem Limestone Co. "Thomas, Francis H.
Fulmer Co. Burnell, Henry J. Johnson, Robert M. Williams, John C.	*Matthews, Charles H. "Muicey, Paul A. Tremayne, W. Earl Wagner, Charles W.	FINLEYVILLE	No Data Supplied Berman, Fred J. Spooner, William H.
No Data Supplied Douglass, A. E., Jr. Fenstra, W. M.	DANVILLE	MATHES COAL CO. "Kebble, William	HARRISBURG
CENTER VALLEY	No Data Supplied Pursel, Robert N.	FORD CITY	Anthracite Comm. Corgan, D. L.
N. J. Zinc Co. Childs, Mark S. Forsyth, William T. Huyett, Sterling S. Moehs, Noel N. Wiles, H. B. Seip, Robert H., Jr.	DELAWARE CITY	No Data Supplied Bartony, Henry E.	Andrew S. McCraith & Son, Inc.
CHARLEROI	No Data Supplied White, Paul F.	FORTY FORT	*Pennington, Fred A. Pa. Dept. of Forests & Waters Montgomery, Hugh B.
Lee-Norse Co. Arentzen, Einar M. *Fitzgerald, Harry J.	DREXEL HILL	NATIONAL MINE SERVICE CO. McGarry, Raymond B.	Pa. Dept. of Mines & Min. Ind.
No Data Supplied Rodgers, Wesley P.	No Data Supplied Eldon, William A. C. Gillan, Charles A., Jr.	No Data Supplied Arbogast, Karl F. Decker, R. G.	*Becker, Norman F. *Becker, George A. Chupeck, John Howell, Roger Kennedy, Joseph T. Maginnis, Joseph B. Maize, Clyde H.
CHESTER	DRIFTON	FRACKVILLE	Pennsylvania Turnpike Comm. "Smith, James D.
Scott Paper Co. "Mateer, Raymond G.	COXE ESTATES	READ REALTY CO. Haupt, David F.	HAVERFORD
CLARION	COXE, DANIEL M.	NO DATA SUPPLIED Beecher, Arthur F. Lewis, Thomas J.	PA. DEPT. OF HIGHWAYS Zinni, Nunzi P.
No Data Supplied Miles, Jack G.	DRIFTWOOD	FRANKLIN	WARNER VAUGHN CO. Vaughn, Warner G.
CLAIRTON	METAL WIRE RECOVERY CORP. "Gibson, Kenneth H.	JOY MFG. CO. Barrett, A. Lee	NO DATA SUPPLIED "Humphrey, Effingham P.
U. S. STEEL CO. Walks, Robert L.	DU BOIS	*Calder, A. William Osgood, Charles F. "Rollins, Lester G.	HAZELTON
CLARKS SUMMIT	KLINE ENGRG. & CONTR. CO. KLINE, F. C.	NO DATA SUPPLIED Greer, Robt. Dale	BARRETT HAENTJENS & CO. Haentjens, Walter D. Moscon, John A.
International Salt Co. Parrish, Floyd G.	NO DATA SUPPLIED Gillette, G. Marshall	FREELAND	*Rupert, Charles D. Capparell S. & Conat. Co. "Capparell, S. T.
No Data Supplied Conroy, W. E. Keenan, Alan F., Jr.	DUNMORE	NO DATA SUPPLIED Davis, Edward E. Johnson, Harold W. Poleri, Ralph	CENTRAL PA. QUARRY STRIPPING & CONST. CO. Butler, William C. M., Jr. Butler, William C. Morris
CLEARFIELD	TURNPIKE COAL CO. Vitali, Angelo	GETTYSBURG	*LaMont, Ralph C. Welliver, Robert M. CHIAMELLI COAL CO., INC. Chiamelli, George M.
Maple Hill Coal Co. Davidson, Alan R. Penbrook Contr. Corp. Crum, Stanley E. D. C. Penoyer & Co. Penoyer, Robert C.	DUQUESNE	NO DATA SUPPLIED Wright, Ralston E.	CORTEALE CONSTRUCTION CO. Correale, Palmer
COATESVILLE	NO DATA SUPPLIED Holstein, Leon S.	EAGLES MERE	DICK CONSTRUCTION CO., INC. Dick, Arthur E., Jr.
Lukens Steel Co. "Potter, Horace W. Steidle, Howard	EASTON	NO DATA SUPPLIED Blanchetta, P. F.	DICK, Donald B. Keuch, Luther E.
COLMAR	ALPHA PORTLAND CEMENT CO. AMES, JOHN A. Brownstead, Ernest F. Magee, J. F.	GILBERTON	HONEYBROOK MINES INC. "Altmiller, Charles H., Jr. Correale, Fred R.
Link-Belt Co. Bottorf, Robert G.	GEN. CRUSHED STONE CO. PARTON, W. Julian Lafayette College Montgomery, Arthur	GIRARDVILLE	INDUSTRIAL SUPPLY CO. Schwartz, Arthur D.
CONSHOHOCKEN	NO DATA SUPPLIED "Bailey, E. G. Farrell, Cottrell	GLEN LYON	FRANK SWABB EQUIP. CO. Swabb, Frank L.
Alan Wood Steel Co. "Schenck, W. P.	SUSQUEHANNA COLLIERIES CO. "Christian, William E. Farrell, Michael F.	VIBRATION ENGRG. CO. Patton, Francis A. "Petri, Anthony J. Powers, Edward R.	KINGSTON

Pennsylvania-Pennsylvania	
State Equip. Co.	Crucible Steel Co. of Am.
Wright, Lundy R.	Chang, Melvin C.
No Data Supplied	*Muns, George E.
Donizio, Pat Jr.	*Schenck, George H. K.
Corgan, Leo R.	Tillson, Charles B., Jr.
Corgan, William H.	Dictating Equip. Corp.
Corgan, John B.	Bogan, Joseph A., Sr.
Edfort, Ralph	Dravo Corp.
*Geise, Wm. B.	Banning, A. Tanner
Gleason, Benjamin	Berg, Philip J.
Keller, Henry K.	*Chisholm, John A.
*Kenworthy, O. E.	Engelleitner, W. H.
Kudlich, Franz E.	Nilsen, A. A.
Powell, Ed T.	Phelps, Donald D.
Randall, H. R.	*Porteus, John H.
Ward, Joseph E.	Price, William L.
Whaite, R.	E. I. Du Pont de Nemours
LANCASTER	Quin, Robert A.
Mayo Tunnel & Mine	Duquesne Light Co.
Equipment	Draper, John C.
*Mayo, Robert S.	Elkin, James E.
Mac-It Parts Co.	Younkins, James A., Jr.
Roth, William B.	Eastern Gas & Fuel Assoc.
LANGELOTH	Allabrook, S. T.
Climax Molybdenum Co. of Pa.	Boxley, A. P.
Wheeler, E. S.	*Burton, Earle B.
LANSFORD	Griffin, John P.
Lehigh Coal & Navigation Co.	Kalasky, John D.
Arner, Henry E.	Krickovic, Stephen
Sternier, Francis E.	Rothenhoefer, Walter
No Data Supplied	Sawyer, Chas H.
De Lauretis, A. J.	Eavenson, Auchmuty & Greenwald
*Evans, Evan	*Auchmuty, R. Laird
Delaunais, Peter A.	*Greenwald, Edward H.
LATROBE	The Elenco Corp.
Am. Cyanamid Co.	Arabia, Lewis
Gieseke, E. W.	Emerald Coal & Coke Co.
Kennedy, James S.	Affelder, William L.
Kennametal, Inc.	Cornelius, Clinton C.
Engle, Edgar W.	Stevenson, William G.
McKenna, Philip M.	Equitable Gas Co.
Liberty Stone Co.	"Tilton, J. G.
*Pfemister, Harry I.	Firth-Sterling, Inc.
LEBANON	Redmond, John C.
Bethlehem Cornwall Corp.	Fishbach & Moore
Anderson, Arvid E.	Gallagher, Pat V.
Ball, Samuel S.	Foote Bros. Gear & Mach.
Harris, William W.	*Pyle, Paul P.
Schumacher, C. R.	Freeman & Leech Inc.
Bethlehem Steel Co.	"Leech, W. A., Jr.
Dominguez, E. C.	John W. Galbreath & Co.
Fegan, Lloyd W., Jr.	"Hollingshead, Earl D.
Horst, Russel J.	Gardner-Denver Co.
Larpenteur, Bernard J.	Nichols, Donald C.
Moyer, Wm. H.	General Electric Co.
Calcite Quarry Corp.	Drisko, John W.
Patton, George E., Jr.	Kingsley, Harry D.
No Data Supplied	Gilco, Inc.
Frederiksen, T. R.	*Gilbert, Alfred G.
Meyer, Simon J.	Goodman Mfg. Co.
Peets, Robert G.	Cogrove, John C., Jr.
Walter, A. R.	Gulf Research & Dev. Co.
LEHIGHTON	Trump, Robert P.
No Data Supplied	Wyckoff, Ralph D.
*Eissasser, Charles B.	Harbison-Walker Refr. Co.
LEYMOYNE	Birch, Raymond E.
No Data Supplied	Cook, Charles P.
Dowd, O. E., Jr.	Galbraith, Scott P.
LEVITTOWN	*Wicken, Oscar M.
No Data Supplied	Wilhelm, Daniel C.
Parker, Howard A.	Hercules Powder Co.
LEWISBURG	Brown, Thomas E.
No Data Supplied	*Kelleher, Robert F.
*Fetherston, John T.	Heyl, James P.
LIBRARY	Sisti, Dominick C.
Consolidation Coal Co.	Walker, Joseph L., Jr.
Hanson, Victor D.	Internal Revenue Service
Vonfeld, Jacques M.	Dodge, Charles H.
Pittsburgh Coal Co.	*Vogel, Leo J.
Bente, Henry J.	Island Creek Coal Sales Co.
*Blanford, Thomas E.	McCarthy, Jerome C.
Rose, Henry C.	Jeffrey Mfg. Co.
Tarleton, G. O.	*Howell, John P.
No Data Supplied	Jones & Laughlin Steel Corp.
*Clark, Joseph T.	Beutner, Edward L.
Engott, Joseph R.	*Brown, Dwight C.
LOCUST GAP	Cooper, E. R.
No Data Supplied	*Crump, Robert M.
Navrocky, Edw. R.	Getty, William P.
MAHONY CITY	Henning, Carl C.
No Data Supplied	Leber, Jack W.
Kershetsky, Jos. T.	Lichy, Charles M.
Pearson, F. C.	Morris, Jack E.
NEW CASTLE	Potter, Charles L.
U. S. Steel	Seaberg, Adolph C.
Luttrell, Eugene M.	Sleeman, Clarence H.
No Data Supplied	Stowasser, William H., Jr.
Kurtz, E. L.	Turner, Howard S.
NESQUEHONING	Joy Mfg. Co.
Fauzio, Frank P.	Berthelot, Ted F.
Fauzio, James	Butters, Howard E.
NEW CASTLE	Cooney, Edwin W.
U. S. Steel	*Courtright, John P.
Luttrell, Eugene M.	Dorfman, Morton I.
No Data Supplied	Felderman, L. G.
Kurtz, E. L.	*Goodrich, R. H.
MARCUS HOOK	Hair, Richard T.
Fenix & Scisson, Inc.	Helmick, Jr., Louis G.
*Geary, Daniel	Lechner, Ray A.
MATHER	Lockhart, Allan J.
Mather Collieries	*Mancantelli, Robt. W.
Brookes, J. Allan	*Morrow, J. D. A.
MCADOO	Nyquist, Hugo C.
Hartmann Coal Mining Co.	
Hartmann, Waldemar	
MIDLAND	
Crucible Steel Co. of America	
*Thompson, C. Vance	
MONACA	
St. Joseph Lead Co.	
Long, Carleton C.	
Mitchell, Robert F.	
*Najarian, Herand K.	
MOHINTON	
No Data Supplied	
*Stickler, Charles W., Jr.	
MONESSEN	
Pittsburgh Steel Co.	
Bailey, David R.	
MONROEVILLE	
U. S. Steel Corp.	
Brown, James H.	
Burch, Eliza F.	
Clednen, J. D.	
Kuchta, Bernard R.	
Price, J. G.	
Reed, Thomas F.	
Romig, O. E.	
Schoenberger, R. W.	
*Wayman, Cooper H.	
MORGANTOWN	
Bethlehem Cornwall Corp.	
Anspach, David M.	
Ketter, Richard P.	
Leske, Reinhold H.	
Moulds, Donald G.	
*Parks, James C.	
Seifert, David E.	
Sheary, George W., III	
Bethlehem Steel Co.	
*Sleeman, Robert W.	
U. S. Bureau of Mines	
Ageton, Robert W.	
MONTOURSVILLE	
No Data Supplied	
Hoyt, Charles D.	
MOUNTAIN TOP	
No Data Supplied	
Biscontini, Arnold	
NANTICOKE	
Glen-Nan Mining Co.	
Goeppert, Albert R.	
M. A. Hanna Co.	
Gibbons, Charles Allen	
Newport Exc. Co.	
Biscontini, Albert L.	
Haas, Raymond F.	
Susquehanna Collieries	
Jones, Donald W.	
No Data Supplied	
Kienzle, Geo. H.	
MAZARETH	
Lone Star Cement Co.	
Embree, Francis P.	
Nazareth Cement Co.	
Scott, Herbert J.	
Penn-Dixie Cement Corp.	
Scott, Richard P.	
NEMACOLIN	
Buckeye Coal Co.	
Grant, Alex	
Lindstrom, Charles J.	
Trevorow, George C., Jr.	
No Data Supplied	
Hanish, William R.	
NESQUEHONING	
Fauzio, Frank P.	
Fauzio, James	
NEW CASTLE	
U. S. Steel	
Luttrell, Eugene M.	
No Data Supplied	
Kurtz, E. L.	
MICCO, JOHN C.	
Otto, John F.	
NORRISTOWN	
E. J. Lavino & Co.	
Dill, W. Edwin, Jr.	
NORTHAMPTON	
Dragon Cement Co.	
*Anderson, Frank J.	
Lehigh Valley Air Poll. Cont.	
Doherty, R. Emmet	
No Data Supplied	
Anthony, Stanley E.	
Kowalsky, T. J.	
OLD FORGE	
Sullivan Trail Coal	
Semenza, Nunzi P.	
No Data Supplied	
Casella, Patrick J.	
OLIPHANT	
Hudson Coal Co.	
Stonebraker, Wesley I.	
GRWIGSBURG	
No Data Supplied	
Jones, John Edward	
OXFORD	
No Data Supplied	
*Gillingham, Thomas E.	
PALMERTON	
N. J. Zinc Co.	
Brubaker, Gordon	
Fetterolf, Luther D.	
Freyberger, Wilfred L.	
Fuller, M. Luther	
Lupton, D. Keith	
No Data Supplied	
McGary, Phillip E.	
Rodda, John L.	
PAOLI	
Allen-Sherman-Hoff Pump Co.	
Ashe, Donald G.	
Keyser, James M. B.	
Stephenson, William B.	
Foote Mineral Co.	
Crawford, Brodie E.	
*Flow, Ralph C.	
Shay, Felix B.	
PECKVILLE	
Village Slope Coal Co.	
Coccodrilli, Louis J.	
No Data Supplied	
Corazzi, Peter A.	
PERKASIE	
No Data Supplied	
Trumbull, R. Carr	
PHILADELPHIA	
Aero Services Corp.	
*Agocs, William B.	
Hess, Geo. L.	
*Jensen, Homer	
Whitaker, John C.	
Allis Chalmers Mfg. Co.	
*Seward, Donovan R.	
Am. Engrg. Co.	
Belsak, Frederick C.	
Atlantic Ref. Co.	
Laskaris, Lycurgus	
Berwind-White Coal Mining Co.	
Berwind, Chas. G., Jr.	
Berwind, Chas. G.	
Blocked Iron Corp. of Am.	
Longo, John S.	
Fuskar, Victor	
Chain Belt Co.	
Davis, Calvin R., Jr.	
Combustion Engineering Co.	
*Ellis, Robert S.	
W. W. Criswell Co. Inc.	
Criswell, W. W., Jr.	
Drexel Institute of Technology	
Robins, James H.	
FOOTE MINERAL CO.	
Chambers, Gordon H.	
Raynor, Wm. M.	
Gardner Denver Co.	
Malmgren, Carl E.	
Tolosky, Roger R.	
Gen. Refractories Co.	
*Blinzler, Lee E.	
Coddington, Samuel L.	
Rappold, William F.	
Thorpe, Drew M.	
Greenberg Engrg. Co.	
*Greenberg, Wm. B.	
Griswold, McLean & West	
West, Alan D.	
Grubman Bros. Inc.	
Hulbert Oil & Grease Co.	
Jones, Sheldon	
Janney, Dulles & Battles, Inc.	
Focht, Doster	
Johnson-March Corp.	
*Mau, George A.	
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*Greenberg, Wm. B.	
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No Data Supplied	
Casella, Patrick J.	

Pennsylvania-Pennsylvania

Russell, John D.	Nelson, Elwood B.	Martz, Lloyd L.	Susquehanna Collieries Co.
Sheriger, Paul M.	Peterson, Almer J., Jr.	Muehlhoff, William C.	"Schanz, John J., Jr.
Smith, Darrell	Richards, Paul L.	Williams, R. Y.	"Spicer, T. S.
Starbuck, David L.	Stacy, M. C.		Stefanko, Robert
Wearly, William L.	Sweeney, James F.		Tuttle, Orville E.
*Whinnin, William J.	Thomas, Donald M.		
Koppers Co. Inc.	*Werft, Harold H.		WALLINGFORD
Donath, Ernest E.	Williams, C. H.	Hoffman Bros. Drilling Co.	No Data Supplied
Llewellyn, R. L.	Wilson, Philip J., Jr.	Hampton, William H.	*Cameron, Frank
Rice, Owen R.	Zanolli, S. W.	Markle Bullers Coal Co.	
Rose, E. H.	Univ. of Pittsburgh	Bullers, W. Irvin	
Thiessen, Gilbert	*Dines, Edward A.		WAMPUM
Zimmerman, R. E.	*Flint, Norman K.		Medusa Portland Cement Co.
Link Belt Co.	*Tartaron, X. Francis		Weaver, Kenneth N.
Werner, Otto W.	Westinghouse Elec. Corp.		
Mfrs. Light & Heat Co.	*Ivy, Joe G.		WANAMIE
Rosner, Robert A.	Rector, B. E.		No Data Supplied
Mine Safety Appliance Co.	Risler, Clark B.	Burroughs Corp.	Waslofski, W.
Bright, Graham	Thomas, Walter E.	Mathies, Albert J.	
Deike, George H.	J. W. Woomer & Assoc.		WASHINGTON
Deike, George H., Jr.	*Boyd, John T.	RAMEY CLEARFIELD COUNTY	Farmount Supply Co.
Donahue, C. M.	Hinkle, Melvin E.	No Data Supplied	Cavanagh, Wm. C., Jr.
Johnson, Henry R.	Thomas, Lawrence M.	SAVAGE	R. G. Johnson Co.
Redenbaugh, Harry E.	*Woomer, J. W.	No Data Supplied	Johnson, Stuart C
Ryan, John T., Jr.	*Workman, William A.	RAVEN RUN	No Data Supplied
White, Everett M.	No Data Supplied	Hazle Brook Coal Co.	Frazier, John E.
Nat'l Mine Service Co.	*Alford, Newell G.	Williams, Walter B.	
Bradley, Eri A.	Barnes, Robert W.		WAVERLY
MacVean, Gordon	Barrett, Jas. L.	READING	No Data Supplied
Pattison, Thomas T.	Baton, Charles B.	Beryllium Corp.	Golas, Ernest
National Steel Corp.	Calverley, Jos. G.	*Forbes, Jacobin M.	
Humphrey, George M.	*Campbell, L. C.	Reading Tube Co.	STATE COLLEGE
Northwest Magnesite Co.	Campbell, Robt. W.	Arnot, Harold J.	Pa. State Producers Guild
Sargent, Charles A.	Cooper, Maurice D.	No Data Supplied	Inc.
Rufus M. Palmer	Dasher, John	Crosby, Richard E.	*Mullen, Willard F.
*Palmer, Rufus N.	Dodworth, James R., Jr.		Penn State Univ.
Pennsylvania Drilling Co.	Earthorne, William		SALTSBURG
*Melvin, John H.	*Greenwald, Harold P.	Joy Mfg. Co.	No Data Supplied
*Parse, Richard G.	Giffen, John	Wiebe, Donald	*Fleming, Robert M.
Schafer, Robert P.	Halen, Jack D.	SAXONBURG	Lees, Alan E.
Pennsylvania Railroad	Hebley, Henry F.	U. S. Steel	Merrin, Seymour
*Smythe, Richard D.	Herb, James H.	Hagen, Robert E.	
Peoples Natural Gas Co.	Hogan, John E.		STUMP CREEK
Donaldson, George J., Jr.	Kantor, Andrew J.	SCHAFFERSTOWN	Northwestern Mng. & Exch. Co.
Pittsburgh Coke & Chem. Co.	Leonard, Joseph W.	No Data Supplied	*Peterson, Carl A.
*McMullin, C. T.	Leisher, C. E.		
H. K. Porte Co Inc.	McCaa, George S.	SCHUYLKILL HAVEN	WAYMART
Drain, James A.	McElroy, George E.	Lincoln Anthracite Co.	No Data Supplied
Tallion, Walter A.	Montag, H. A.	*Fox, Edward G., III	Schreckengost, E. D.
*Vervaeke, Robert G.	*Morrow, J. B.	U. S. Bureau of Mines	
J. F. Pritchard & Co.	Queer, Thomas H.	Brady, George A.	WAYNESBURG
Spanier, C. V.	Russell, Charles C.	*Eckerd, James W.	No Data Supplied
James A. Redding	Russell, Freeman L.	Ingersoll, Dallas E.	Saxe, J. Arch
Redding, James A.	Shallenger, J. M.	Jacobs, Howard D.	
Roberts & Schaefer Co.	Shields, Joseph J.	Kuebler, Charles S.	WEST CHESTER
Middleton, Ray T.	Shipley, Grant B.	Schimmel, John T.	Pa. Crusher Div.
Rust Engrg. Co.	Sturges, Frank C.	No Data Supplied	Owens, David W.
Robinson, T. H.	Thiessen, Linwood	Bailey, Harold L.	No Data Supplied
St. Laurence Fluorspar, Inc.	Tisdale, Rowland A.	Buch, John W.	Smith, Hubert C.
Keaney, Robert C.	Van Houten, Herman		Weldin, William A.
Shenango Furnace Co.	Weidlein, Edward R.		WEST MILFLIN
Brown, Fayette, Jr.	Weniger, Oscar S.		Westinghouse Elec. Corp.
J. K. Smit & Sons, Inc.			Goets, Lorenz J.
Morander, Harold G.			WEST NEWTON
W. P. Snyder & Co.			A. M. Stevenson & Assoc.
Zobitz, Edward			*Brody, Albert J.
Sprague & Henwood Inc.			No Data Supplied
Fletcher, Kevin A.			Stevenson, G. B., Jr.
Tata Coal Co.			WEST PITTSSTON
Lets, Harold D.			Mammoth Coal Co.
Travelers Insurance Co.			*Lambert, Kenneth A.
Kovash, Louis S.			Pagnotti Coal Co.
W. S. Tyler Company			*Moran, Francis A.
Lawrence, Harry F.			Pagnotti Enterprises
U. S. Bureau of Mines			*Ventre, Henry
*Barry, Anthony J.			Sullivan Trail Coal Co.
Dowd, James J.			Pagnotti, Louis J., Jr.
*Evans, Robert Lee			
Feltier, Stanley A.			WEST WYOMING
Gray, Thomas E.			No Data Supplied
Magnuson, Malcolm O.			Adonizio, Charles
Mahan, Warren M.			WHEATLAND
*Maize, Earl R.			Wheatland Tube Co.
Merrits, William M.			*Leisy, R. Warren
*Miller, Thomas C.			WHITE HAVEN
Nagy, John			Wilmot Engrg. Co.
Palowitch, Eugene R.			Hammonds, Haydn
*Polack, Samuel P.			Hersker, Harry C.
*Stahl, R. Ward			Hildebrand, John F.
Thomas, Edward M.			*Ippoliti, Joseph E.
Thomson, Robert D.			Jenkins, Carl S.
U. S. Steel			Jeppesen, Harold C.
Barnhart, Arthur C.			
Bateman, Robert N.			WILKES BARRE
Becker, F. M.			Am. Chain & Cable Co. Inc.
Beinlich, J. J.			Todd, Emerson H.
Bitner, A. Wayne			Amer. Cyanamid Co.
Blackwood, Harold T.			Connor, Edward C.
Boyle, John A.			Atlas Powder Co.
Breitenthal, A. J.			*Hutcheson, Allan F.
Brisse, A. H.			Glen Alden Coal Corp.
Burge, Furman H.			Devens, Willis R.
Chase, Philip W.			Bradbury, Harry W.
Core, Jesse F.			Kilpple, Fred L.
Coy, Richard J.			Goodman Mfg. Co.
Dengler, Theo. J.			Farrell, Francis X.
Ferguson, J. Robt., Jr.			Sanders, Floyd S.
Fisher, Warren E.			Commonwealth Dept. Mines
Hosmer, Henry L.			Meyer, Karl A.
Keller, George E.			Hollenbackest
Knapp, R. Herbert			Price, Thomas C.
L'Esperance, Robert L.			Lehigh Valley Coal Co.
Maddox, Phillip S.			*Humphrey, John M., Jr.
Martin, James S.			Weatherholt, Henry S.
McMorris, William L., Jr.			
Morris, Roger D. C.			

Pennsylvania-Texas

TEXAS	
ABILENE	
Tesco Equipment	Collins, David L.
No Data Supplied	Perini, Vincent C., Jr.
	Petuch, B.
	Sears, Dick
ALICE	
No Data Supplied	Edmonds, Bryon P.
	*Kline, Loren E., Jr.
ALPINE	
No Data Supplied	*Foley, Edward J.
	Pulliam, R. N.
AMARILLO	
Amer. Smelt. & Refin. Co.	Oen, Lars
AUSTIN	
Reed & Brewer	*Reed, Charles B.
U. of Texas	*Flawn, Peter T.
No Data Supplied	Bucknall, Eric H.
	Hill, Harry P.
BELLAIKE	
Texas Co.	McKinlay, Philip F.
	Pancake, Evan
No Data Supplied	*Malherbe, Gideon J.
BLANKET	
Ryan Engrg. Corp.	*Ryan, Daniel P.
BORGER	
Western Chem. & Supply Co.	Hill, James M.
BROWNSVILLE	
No Data Supplied	*Nye, S. Spencer
BURNET	
Southwestern Graphite Co.	Miller, Robert P., Jr.
COMANCHE	
No Data Supplied	Hatchett, Sam P.
CORPUS CHRISTI	
Amer. Smelt. & Refin. Co.	Michal, Edwin B.
Col. So. Chem. Corp.	Paciotti, Fernando A.
No'l Lead Co., Baroid Div.	Net'l Lead Co., Baroid Div.
Baker, L. Maurice	Reynolds Metals Co.
Reynolds Metals Co.	Sherwin, Ralph S., Jr.
No Data Supplied	Hammer, Wm. L.
	Johnson, Charles H.
DALLAS	
Allis-Chalmers	*Stahl, Harvey L.
	William J. Carey
	Haynes, Harry E.
Century Corp.	Spencer, Morris G.
Conley-Lott-Nichols Mach. Co.	Conley-Lott-Nichols Mach. Co.
	*Daum, Eugene T.
Delhi-Taylor Oil Corp.	Dixie Lead Co.
Soltes, Elton D.	Bradfield, Charles B.
Dixie Lead Co.	Dresser Indust. Inc.
	Lawrence, John
Geophysical Service, Inc.	Montgomery, Lindell E.
	Saunders, Donald F.
	Thomas, J. W.
Graue & Co.	Graue, Co.
	*Graue, William D.
Halliburton Oil Well Cmfg Co.	Halliburton Oil Well Cmfg Co.
	*Wimberly, C. L.
Hammermills Inc.	Krage, August P.
	Koch & Fowler & Grafe Inc.
	*Dallas, Orlan L.
Smallwood & Son Oil & Gas	Smallwood, Joe L.
	Smallwood, Joe L.
Socony Mobil Oil Co., Inc.	Reichertz, Paul P.
PA COLET	
Paco Products Inc.	Pasco, Edwin E.
Powell, William H., Jr.	Sansom, Richard E.
YORK	
Industrial Minerals, Inc.	No Data Supplied
Wilson, Lewis G.	Leeson, Grant
No Data Supplied	Perry O. H.
Aston, Trevor	*Taber, Stephen
*Everett, William W.	Marks, Geo. M., Jr.
*Jones, George B.	Ulery, Charles B.
*MacCartney, John C.	Beers, Seymour J.
Rinehimer, E. D., Jr.	
Storts, Alfred F.	
Williams, Ivor L.	
WILMERDING	
No Data Supplied	*Lowry, Homer H.
WINDBER	
Berwind-White Coal Ming. Co.	Miller, Franklin
*Ocilla, John M.	
No Data Supplied	Seese, Robt. H.
WYNNEWOOD	
Allen-Sherman-Hoff Pump Co.	Allen, Homer E.
WYOMING	
No Data Supplied	Talamelli, Vello
YARDLEY	
Elec. Storage Batt. Co.	Venuto, C. Joseph
YATESVILLE	
No Data Supplied	Capone, Patrick J.
YORK	
J. E. Baker Co.	Duersmith, L. J.
Paul, Robert A.	
W. S. Frey Co.	
Frey, William S.	
Hardinge Co., Inc.	Brown, C. Blair, Jr.
Doepf, Ellsworth B.	Downes, Harry S.
Hardinge, H. DeForest	Hardinge, Harlowe
Russell, R. J.	
*Zuercher, Edgar M.	
Nat'l Gypsum Co.	
Mensing, Henry E.	
Supreme Supply Co. Inc.	
Frey, John P.	
ZERBE	
No Data Supplied	*Zerbe, T. W.
RHODE ISLAND	
PROVIDENCE	
Peerless Precision Prod.	World Min. & Consult., Inc.
World Min. & Consult., Inc.	*Morgan, David E.
BITF Industries	
*Milligan, W. Edward	
No Data Supplied	
Parker, Norman H.	Brown, Charles W.
*Nelson, Ned E.	
SOUTH CAROLINA	
AIKEN	
United Clay Mines	Godia, Joseph J.
	E. I. du Pont de Nemours & Co.
	Wills, William A.
CLOVER	
Commerciallores	*Castle, James E.
	Strohl, John J.
ENGROE	
Zonolite	Hash, Lewis J.
	Skardon, A. Hooper
	Stewart, O. F.
TENNESSEE	
ALCOA	
Harrison Const. Co.	*Sayrs, Richard L.
BRENTWOOD	
Geologic Associates	"Throckmorton, Raymond T., Jr.
CHATTANOOGA	
Aston Mineral Engrg. Co.	"Aston, R. Lee
Vitro Chemical Co.	Kruesi, Paul R.
COLUMBIA	
No Data Supplied	Powell, Jas. F.
	Sullivan, William L.
CONCORD	
No Data Supplied	Thoenen, John R.
COPPERHILL	
Tenn. Copper Co.	Clay, Roy G.
	Henegar, Herbert B.
	Kopp, Guerdon G.
	Lewis, F. M.
	Longworth, Fred J.
	Magee, Maurice
	Moore, Donald P.
	Schultze, John F.
	Seaman, Clarence F.
	Sharp, Samuel E.
	Weaver, Lamar
No Data Supplied	Bair, James C.
	Flournoy, Ezell
	Ramsey, J. R.
	Wagner, Delbert R.
DUCKTOWN	
Tenn. Copper Co.	Annand, A. D.
	Gibson, Otis J.
	Kendall, Hugh F.
	Kingman, Owen
No Data Supplied	Estabrooks, M. B.
ERWIN	
No Data Supplied	*Hunter, Charles E.
GLEASON	
United Clay Mines Corp.	Lowe, Robert D.
JEFFERSON CITY	
New Jersey Zinc Co.	Aubert, William D.
	Hill, William T.
	McDougal, Samuel E.
	Provost, John F.
U. S. Steel Corp.	
	Miller, Joseph A.
	Wilson, Robert T.
No Data Supplied	
	Brophy, Frank B.
	*Jennings, E. B.
	Miller, Howard W.
	Redeker, Immo H.
JOHNSON CITY	
No Data Supplied	*De Beck, Hubert O.
KINGSPORT	
No Data Supplied	Evans, T. B.
KNOXVILLE	
Volunteer Port. Cement Co.	Bozeman, James A.
Sanford-Day Iron Works	*Durk, Robert R.
	Moreman, Wm. D.
	*Williams, Cyril H.
American Smelting & Ref. Co.	
	Elmon, Paul I.
	Kent, Deane F.
Ingersoll Rand Co.	
	Flynn, Andrew L.
	MacDuff, Richard D.
	Smedman, John P.
	Forbes, D. D.
Gardner-Denver	
	Franz, George A.
	*Jenkins, Don D.
	Jones, Robert E.
U. S. Geological Survey	
	Laurence, Robert A.
	Lesure, Frank G.
U. S. Bureau of Mines	
	Lynch, Victor J.
	Valley, James L.
MADISON	
No Data Supplied	Fifeild, Richard G.
MOBRIDGE	
U. S. Army Corps of Engrs.	*Feilde, Stuart R.
	Fawkes, Fred A.
	Hall, Arthur E.
	Hayes, Joel P.
	Hill, Robert S.
	Riley, James M.
	Ryan, John M.
	Strande, Carl A.
	Robertson, Thomas M.
	Knapp, Edward Jr.
	*Rothrock, Edgar P.
	Spring, Stanley
TENNESSEE	
Harrison Const. Co.	
	*Sayrs, Richard L.
ALCOA	
Harrison Const. Co.	
	*Sayrs, Richard L.
BRENTWOOD	
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CHATTANOOGA	
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CONCORD	
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	Moore, Donald P.
	Schultze, John F.
	Seaman, Clarence F.
	Sharp, Samuel E.
	Weaver, Lamar
No Data Supplied	Bair, James C.
	Flournoy, Ezell
	Ramsey, J. R.
	Wagner, Delbert R.
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	Wilson, Robert T.
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	Brophy, Frank B.
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	Miller, Howard W.
	Redeker, Immo H.
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	*Williams, Cyril H.
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Ingersoll Rand Co.	
	Flynn, Andrew L.
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	Smedman, John P.
	Forbes, D. D.
Gardner-Denver	
	Franz, George A.
	*Jenkins, Don D.
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	Sharp, Samuel E.
	Weaver, Lamar
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	Knapp, Edward Jr.
	*Rothrock, Edgar P.
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	Provost, John F.
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	Wilson, Robert T.
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	Flynn, Andrew L.
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	Franz, George A.
	*Jenkins, Don D.
	Jones, Robert E.
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	Lesure, Frank G.
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	Strande, Carl A.
	Robertson, Thomas M.
	Knapp, Edward Jr.
	*Rothrock, Edgar P.
	Spring, Stanley
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	*Sayrs, Richard L.
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Vitro Chemical Co.	Kruesi, Paul R.
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	Sullivan, William L.
CONCORD	
No Data Supplied	Thoennen, John R.
COPPERHILL	
Tenn. Copper Co.	Clay, Roy G.
	Henegar, Herbert B.
	Kopp, Guerdon G.
	Lewis, F. M

Texas-Utah

Southern Lead Co.
Murphy, D. Bentley
Texas Power & Lt. Co.
Cross, Louis D.
Titanium Metals Corp.
Kane, Robert L.
Tx Oil Corp.
*McNab, John S., Jr.
US Army
Munshison, John W., Jr.
No Data Supplied
*Bostick, J. Wallace
Hickman, C. M.
Jennings, P. H.
*Keating, Thomas W.
McGart, H. J.
Riggs, Karl A.

DENTON

No Data Supplied
Gray, Fred E.

DUMAS

Amer. Zinc Co. of Ill.
Mosier, Arnold G.

DUNDEE

No Data Supplied
Moseley, Cecil R.

EAGLE PASS

No Data Supplied
Ovitz, Ernest G.

EL PASO

Amer. Smelt. & Ref. Co.
Clendenin, Thomas P.
*Deckrow, Theon R., Jr.
Godsey, Edwin S.
Horle, Ariel F.
Kendall, Francis P.
*Mellen, Romney J.
Morton, N. A.
Nock, W. J.

*Terrill, Joe D.

Urquhart, James G.

Whitton, W. H.

Derbyshire Steel Co.

Derbyshire, M. S.

Dickinson Labs Inc.

*Dickinson, George G.

El Paso National Gas Co.

Bevan, Horace D.

La Fave, V. A., Jr.

El Paso Testing Lab.

*Seigel, Leon

H. W. Foester

Foester, Hallard L.

Foester, Hallard W.

Wilkins, Richard G.

Gardner-Denver Co.

Jeter, Frazer L.

Hirsch Bros. Mch. Co.

Harper, Charles S., Jr.

Hirsch, Homer C.

Ingersoll-Rand Co.

Cleveland, James E.

*Head, Murray W.

Terrill, Maurice W.

Tomkinson, Joe A.

Joy Mfg. Co.

Douglas, John E.

Miller, Earl E.

Mine & Smelter Supply Co.

Brady, George T.

Phelps Dodge Refg. Co.

Mianer, Howard I.

Texas Western College

Falconer, Robert A.

Graham, John Fraser

Ruotsala, Albert P.

Sproule, Barton M.

*Thomas, Eugene M.

Geo. S. Thomson, Co.

*Rogers, Jonathan W.

Universal Explor. Co.

*Fischer, Louis

Westinghouse Elec. Corp.

Lino, Theo. R.

Worthington Corp.

Alers, Perry A.

Danver, Wm. E.

No Data Supplied

Benedict, Edwin A.

Brooks, John M., Jr.

Buell, Lloyd T.

Canales, Frank J.

Carlisle, L. Reid

Chavez, Ernesto E.

Conder, L. Stevens

Congdon, Gene E.

Davenport, James D.

Deisler, Paul F.

Derrick, Kenneth J.

Dempsey, J. P.

Fox, Fred L.

Fuentes, C. A.

Garard, William J.

Garbrecht, L.

*Gordon, Ernest R.

Goss, Eugene R.

Hanson, Joe G.

Ingersoll, Guy E.

Jordan, Charles F.

Kluttz, Joe R.
Lane, Roberts P.
Garcia-Loera, Raymond G.
Lowe, John W.
Maxwell, J. Worth
McDonald, Jose, Jr.
*McKay, Glover S.
Meincon, T. S.
Mulherin, Thomas N.
Ponfورد, R. G., Jr.
*Pyburn, Paul F.
Rodriguez, Gil C.
Schumacher, W. P.
Tolson, Jaylynn Smith
Viescas, A. H.
Visel, C. E.
*Voelzel, Gustave W.
Watson, Paul D.
Weiner, Rudolph S.
Winslow, D. P.

FALL CITY

Susquehanna-Western
*Schlosser, Robert B.

FORT BLISS

US Army
Roberts, David

FORT HOOD

US Army
Canady, Donald W.
Turner, John H.

FORT WORTH

Acme Brick Co.
*Partridge, Padraic
Empire Geophys.
Stinnett, Landy A.
No Data Supplied
Dukes, Wm. F.
Hein, V. N.
*McCart, Robert, Jr.

FREEPORT

Dow Chemical Co.
Krenzke, Fred J.
Levinson, Alfred A.
McAnulty, William N.

GARLAND

Geotechnical Corp.
*Heroy, William B.

GRAHAM

New Idria Mining &
Chemical Co.
Goring, Arthur W.

HASKELL

No Data Supplied
Holland, Thomas H.

HILLSBORO

No Data Supplied
*Hawkins, T. Gaines

HOUSTON

Alexa
Werner, James E.
Armclo Steel
Lloyd, C. Leonard
Austral Oil Co.
Moehlman, Robert S.
Brown Geophys Co.
Brown, Hart

Brown & Root Inc.
*Adams, Theodore F.
Cameron Iron Works Inc.

Allen, Herbert
Campbell, Fertilizer Co. Inc.
*Davis, John M.
Ralph E. Davis Assoc.

*Meyer, D. W.
Duval Sulphur & Potash Co.
Atwood, George E.
Morris, Wm. Page

Gravity Meter Expl. Co.
*Gobel, Harvey L.
*Sorenson, Nelson C.

Gulf Sulphur Co.
*Belmont, William
Hughes Tool Co.

Bartell, Henry L.
Berube, Stephen C.
Martin, Daniel J.

Williamson, Thomas N.
Humble Oil & Ref. Co.
Taylor, Ralph E.

Link Belt Co.
Harry, Robt. R.
Hoch, Thormley S.

Magnet Cove Barium Corp.
Van Dyke, Orien W.
Milwhite Mud Sales Co.

Freeman, William G.
Van Gilder, Kerry L.
Mission Mig. Co.

King, Morton C.

Nat'l Lead Co.
Chaney, James B.
Eisley, Byron C.
Penrose, Reynold J.
*Pushkin, D. B.
Wallace, John B.
Williams, Don E.
Pan Amer. Sulphur
Webb, Harry C.
Robert A. Ray Co.
*Pollard, J. C.
Ray, Robert H.
Rogers' Geophy. Co.
*Rowles, Sam D.

Ruska Instrument Corp.
Ruska, Walter E. A.
Schlumberger Well Surv.
Corp.

Leonardon, Eugene G.

Shell Oil Co.

Levine, Joseph S.
*Robertson, Glenn D.

Sinclair Oil & Gas Co.

Alewine, James W.

Sohio Pet. Co.

Souders, P. Barkley

Stubbs, Duerbeck & Assoc.

*Kawas, Jesus B.

Texas Gulf Sulphur Co.

King, Glenn L.

Orr, Carol L.

Rainey, Dudley L.

No Data Supplied

Staffa, Calvin J.

ODDESSA

No Data Supplied

Maurice, James M.

*Rodman, Earl G.

PASADENA

No Data Supplied

Laughery, Kent E.

PEARSALL

No Data Supplied

Pickett, George B.

PLANO

No Data Supplied

Wilson, Dudley M.

SAN ANGELO

No Data Supplied

*Gregory, Joseph N.

SAN ANTONIO

Jess McNeel Inc.

*Sullivan, Joe P.

Peerless Oil & Gas Co.

Taylor, Vernon F.

Petty Geophy. Eng. Co.

Johnson, G. Milton

Mauldin, Fred G.

Southwest Research Inst.

Curtice, David K.

*Ellis, Walter H., Jr.

Liu, Tien-Shih

No Data Supplied

Boardman, Ray C.

Bond, Robert J.

Brown, Edwin A.

*Edwin, John

Kane, William G.

Lapko, Theodore, Jr.

*Mather, William B.

Romano, Louis C.

SAN MARCOS

No Data Supplied

*Pollard, John H.

SILSBEE

Sinclair Oil & Gas Co.

Pollard, Ward K.

SWEETWATER

U. S. Gypsum Co.

Steinmann, Walter D.

TEXAS CITY

Howe Sound Co.

Gates, Ellis H.

Tuthill, Jordan P.

Wei Chang Corp.

Mackey, Thomas S.

No Data Supplied

Johnson, B. W.

VICTORIA

No Data Supplied

Atherton, W. S.

VSLETA

No Data Supplied

Pendell, Geo W.

WACO

No Data Supplied

Nelson, Schuler

WELDON

No Data Supplied

Blakemore, Page B.

Mobil Oil Co.
Pavlovic, Robert
Pan Amer. Petro. Corp.
Peek, Charles A.
Standard Oil Co. of Texas
Lag, Peter
U. S. Smet. Ref. & Ming. Co.
Neuman, James V., Jr.

No Data Supplied

Lamkin, John L.

Skalnik, Victor E.

NEW BRAUNFELS

U. S. Gypsum Co.

Wheeler, Alfred H.

NEWGULF

Texas Gulf Sulphur Co.

King, Glenn L.

Orr, Carol L.

Rainey, Dudley L.

No Data Supplied

Staffa, Calvin J.

ODESSA

No Data Supplied

Maurice, James M.

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No Data Supplied

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Mackey, Thomas S.

No Data Supplied

Johnson, B. W.

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No Data Supplied

Atherton, W. S.

VSLETA

No Data Supplied

Pendell, Geo W.

WACO

No Data Supplied

Nelson, Schuler

WELDON

No Data Supplied

Blakemore, Page B.

WICHITA FALLS

No Data Supplied

Darner, Richard R.

UTAH

BINGHAM CANYON

Kennecott Copper Corp.

Anderson, W. H.

Egleston, Marvin P.

Heim, John E.

Jager, Alan R.

Kerr, Dean D.

Matheson, Kenneth H., Jr.

Norden, Joseph E., Jr.

*Rader, Richard C.

Smith, Sim W.

Smith, Wilbur H.

Utah-Utah

- Moffitt, Jackson W.
Petersell, F. J.
Prescott, Jack D.
Ramey, Russell W.
- EUREKA**
- Bear Creek Mining Co.
Banghart, Roger C.
Centennial Develop. Co.
"McIntyre, E. Steele
"Quigley, James
"Spencer, Harold B.
Watt, Robert E.
Chief Cons. Min. Co.
Fitch, Cecil
Fitch, Cecil, Jr.
- GRANTSVILLE**
- Utah Lime & Stone Co.
Perkes, Ernest S.
- GREENRIVER**
- Vitro Chemical
"Huntsman, S. D.
- HEBER**
- United Park City Mines
"Barnes, Marvin P.
Gray, Arthur W.
Worley, Birl W., Jr.
- HELPER**
- Carbon Fuel Co.
"Diamanti, James J.
Odenthal, Walter B.
No Data Supplied
Diamanti, Chris J.
Vukasinick, Louis L.
- HIAWATHA**
- U. S. Fuel Co.
Rasmussen, A. B.
No Data Supplied
Jackson, T. C.
- HOLLADAY**
- No Data Supplied
Cromar, H. E.
- HURRICANE**
- Coleman Engr. Co.
"Poehlmann, Edwin J.
- KEARNS**
- No Data Supplied
Clark, Robert B.
- KEETLEY**
- New Park Ming. Co.
Archer, Bob F.
- KENILWORTH**
- Independent Coal & Coke Co.
Guy, Walter K.
No Data Supplied
Jackson, Elias O.
- LARK**
- U. S. Smelt. Ref. & Min. Co.
"Boyd, Benton
Cropper, Kenneth F.
Lowell, Gerald F.
Wells, Harold H.
Willie, Don O.
No Data Supplied
Crandall, L. Lee
Fresh, Neil
Gilliam, Clyde W.
Hall, Harry D.
Nealey, Roy D.
Serafino, Bert, Jr.
Sheldon, Wright C.
Tippola, Joseph
Whitmore, Alton L.
- MAGNA**
- Kennecott Copper Corp.
Anderson, Royal P.
Baldee, Lorenzo
Burt, Wayne H.
Ensign, Peter H.
Hubbard, Thomas J.
"Plummer, Neil
Quigley, Charles G.
Ribotto, Joe W.
Richardson, J. W.
Walje, J. Richard
Winterrowd, Burton R.
No Data Supplied
Beck, Clyde
- MEXICAN HAT**
- Texas-Zinc Minerals Corp.
Apland, Kenneth C.
Wakefield, Roger E.
- No Data Supplied
Von Collin, H.
- MIDVALE**
- U. S. Smelt. Ref. & Min. Co.
"Glaspie, Kenneth B.
Creglow, Leon A.
Neilson, A. A.
Scholl, Lester K.
"Stampfle, Frank J.
No Data Supplied
Berghout, Richard
Gray, Vernon L.
Ross, Albin M.
Wanlass, Ralph
- MILFORD**
- No Data Supplied
"Schoo, Henry E.
- MOAB**
- Continental Materials Corp.
Brady, Maurice H.
Delhi-Taylor Oil Corp.
Norman, Larry L.
Norman, Robert R.
Geological Services
"McDougal, Wm. Dean
Hecla Mining Co.
Davis, Vernon C.
"Fenske, Lloyd D.
Lindstrom, Philip
Hidden Splendor Mining Co.
Blakely, Harold W.
Craig, Samuel E.
Edwards, Albert P.
Florence, Henry S., Jr.
Fratto, Don S.
"Karayann, Christopher A.
Loring, William B.
Mullen, John R.
Wood, Edwin T.
Homestake Mining Co.
Jacobson, Edward F., Jr.
"Miner, Gordon M.
Weld, Walter W.
Jen, Inc.
Franklin, W. J.
Mayhew Engrs.
"Mayhew, Eldon J.
Ouray Uranium Co.
Bretschel, Charles E.
Standard Uranium Corp.
Siegfried, Frank E.
Wood, Russell L.
Utex Exploration
Barrett, Theodore J.
"Bilyeu, Virgil A.
Blake, Robert A.
Kundert, Karl H.
Pierson, Max D.
"Steen, Charles A.
Uranium Red. Co.
Hollis, R. F.
"Izzo, T. F.
Jones, Rex L.
Olsen, Kent L.
Poppe, Daniel G.
Ranspot, Henry W.
Unger, Richard W.
No Data Supplied
Carnahan, Edward R.
Decker, G. P.
McCormick, R. E.
McLellan, R. R.
Nelson, Charles E.
Newman, J. Melvin
Poller, Harry S.
Reynolds, Richard C.
Rowe, Carl H.
Smith, Rupert M.
Walker, Glen
- MONTICELLO**
- No Data Supplied
Palmer, Jerald D.
- MURRAY**
- Minerals Ref. Co.
Trover, W. Morris
Murphy Refractories Co.
Stevens, Joseph E.
No Data Supplied
Hansen, Walter R.
Jensen, E. G.
Nelson, Robert D.
- OGDEN**
- U. S. Air Force
Fay, Herbert M.
U. S. Forest Service
Dow, Vernon T.
No Data Supplied
Hiett, Paul
Jordan, Marcus C.
Pike, Julian A.
Peper, R. K.
- PARK CITY**
- New Park Min. Co.
Bauer, Walter E.
"Muth, James V.
- PAYSON**
- Columbia-Gevena Steel Div.
Earnest, Howard W.
"Johnson, Raymond C.
- PRICE**
- Knight Ideal Coal Co.
Carlson, C. Arthur
Spring Canyon Coal Co.
Hileman, Douglas H.
No Data Supplied
Jensen, Ralph C.
Jensen, Robert L.
Watkins, G. R.
- PROVO**
- Columbia Iron Min. Co.
Camp, Leslie W.
Chapman, Rodger H.
Hayes, John K.
"Humphrey, Arthur G.
Mark, Clifford A.
"Moore, Lyman
Reiff, John J.
Sekleman, Robert
Sigman, Victor L.
No Data Supplied
Bickford, K. F.
Bullock, Kenneth C.
- ROYAL**
- Royal Coal Co.
"Woodward, C. Ray
- ST. GEORGE**
- Intermountain Exploration Co.
"Wyman, Richard V.
- SALT LAKE CITY**
- Aero Serv. Corp.
Lee, Herbert P.
American Cyanamid Co.
Brown, Otto R.
American Gilsonite Co.
"Baker, John H.
Goodner, E. F.
Henderson, John H., Jr.
AIME
Hicks, Clifford J.
Amer. Smelt. & Ref. Co.
Anderson, R. E.
Beckstead, Rex C.
Bowditch, Samuel I.
DiSanto, B. J.
Frost, J. F.
Hewitt, William P.
Ness, Arnold W.
Newman, Earsel W.
Vincent, John Dixon
Amer. Zinc, Lead & Smelt. Co.
Mills, Hiram F.
Anaconda Co.
Dwyer, Robert G.
Garmoe, Walter J.
Hansen, Leon A.
Knostman, Richard W.
Mulchay, Roland B.
"Scour, Winton L.
"Thompson, Mercer F.
ASARCO
Lacy, Robert J.
Weiss, Norman
Atomic Energy Comm.
"Peterson, Wilmer R.
Bear Creek Mining Co.
Burgess, Charles Harry
Cook, Douglas R.
Rose, Arthur W.
Weiss, Alfred
Black & Deasen
Deason, B. W.
Bonnieville Ltd.
Macdonald, R. D.
Book Cliffs Coal Co.
O'Connor, Edward S.
Booth Co. Inc.
"Booth, Lionel E.
Boyle Bros. Drilling Co.
"Gillingham, Walter P.
Goldsworthy, Arthur F.
"Goldsworthy, R. T.
"Guard, Alton K.
Haddon, Edwin D.
Robins, N. K.
"Stevens, Victor L.
Cate Equip. Co.
Hughes, David E.
Chain Belt Co.
"Petrie, Peter B.
Chicago Bridge & Iron Co.
"Schultz, Jack W.
Christensen Diamond Products Co.
Augustson, Anders E.
Harris, William L.
Colorado Fuel & Iron Corp.
Bole, J. A.
Combined Metals Red. Co.
Snyder, Edward H.
Comm. Shear & Stamping Co.
"McBirnie, Carl L.
- EMCO CORP.**
- "Bernard, Lynn D.
"Gardner, Percy S., Jr.
Kapp, Ewald
Kirchner, P. Ernesto J.
Mitchell, Charles C.
"Richter, Paul O.
Russell, James K.
Fairbanks Morse & Co.
West, Edmund G.
Foley Bros. Inc.
Bares, L. J. T.
Federal Resources
"Neyman, R. W.
Galigher Co.
Anderson, C. Milton
Evans, S. L.
Huch, Richard O.
"Lange, Lawrence H.
"Wright, Harold E.
Gardner Denver Co.
Andrews, Irving W., Jr.
Jarvis, Owen G.
General Electric Co.
Blakley, R. Thomas
Hohmann, Harold E.
Geo. Engrs. Inc.
"Aldous, T. Melvin
J. M. Grisley Machine Tools
Grisley, Robert J.
Hansen Inc.
"Hansen, Don A.
Larry J. Hays Ins. Co.
Hays, Larry J.
Hercules Powder Co.
Early, Lawrence W.
Hoogestraat, Bernard L.
Sparf, Charles R.
Hewitt Robins Inc.
Speaker, Francis B.
Van Stone, James E.
Hidden Splendor Min. Co.
"Brittain, Richard L.
Christie, Russell L.
"Dwyer, Ed T.
Hayes, Dale I.
Kibbe, Albert P.
Sage, Claude L.
Howe Sound Co.
Kirikian, Arch G.
Independent Coal & Coke Co.
Dyer, Bert W.
Harvey, Stanley C.
"Newberry, Donald J.
Industrial Physics &
Electronics Co.
"Marquardt, C. M.
Ingersoll-Rand Co.
Merritt, Joseph B.
Olund, Robert L.
Intl. Smelting & Refining Co.
Burt, Glen A.
Joy Mfg. Co.
Swiler, William R.
Kennecott Copper Corp.
Anderson, Edwin L.
Bader, John W.
Balmer, Ward E.
Barlow, Vinal S.
Beck, Russell R.
"Bogden, Grey
Boyer, Philip J.
Davis, Kenneth L.
Deneris, George
Erickson, John Duff
Fraser, George L.
Fuller, Thomas R.
Howell, Fred H.
Huffman, Clyde S.
James, Allan H.
Lagergren, Milton A.
Landenberger, J. C., Jr.
Last, Arthur W.
"Meisel, George M.
Michaelson, Chas. D.
Michaelson, Stanley D.
"Mott, Clinton P.
Newman, Elmer C.
"O'Keefe, John P.
Olson, Emmett K., Jr.
"Pehrson, Frank L.
Rausch, Donald O.
Rees, Thomas B.
"Seest, Major W.
Slothrop, Ben H.
Smit, Francis J.
Soderberg, Adolph
"Solomon, James
Thulin, Alvin J., Jr.
"Tibble, Ralph J.
"von Stein, Paul
"White, Mervin G.
Wood, Lewis C.
Zimmerley, S. R.
Kumhills Exploration Co.
"Davis, Dudley L.
Link Belt Co.
Newsome Donald W.
E. J. Longyear Co.
Doolin, James J.
Lottridge-Thomas & Assoc.
"Lottridge, Richard W.
"Thomas, Leonard G.
Machinery Center Inc.
Anderson, Donald O.
Lehner, Kenneth A.
Uzielac, Joe G.
Marvel Mining Co.
"Harrison, Duncan Edward
- MINE SAFETY APPLIANCES CO.**
- Allen, Earl W.
McElhattan, Daniel F.
Mine Safe Corp.
Banta, Royden J.
Minerals Engrs.
"Johnson, J. Fred
Murison, Sal
Clayton, Norman
Mt. States Rubber Co. Inc.
Scofield, Glen J.
Natl. Equipment Co.
Cannon, Wilford S.
Ingraham, Robert B.
Merry, Henry M.
Natl. Filter Media Corp.
"Haedit, Robert V.
New Park Mining Co.
Hansen, Gale A.
Oil Inc.
Harrison, Thomas R.
Park City Cons. Mines Co.
Stehle, Frederick T.
Parsons, Bohle, Evans &
Moffat
Moffat, A. D.
Peterson Filters & Engrs. Co.
Mattison, Robert J.
Peterson, C. Lynn
Pinnacle Exploration Inc.
Baker, Arthur III
S. Price Assoc. Inc.
"Price, John
The Rains Co.
"Rains, Phillip K.
Rare Metals Corp. of Amer.
"Hansen, Leland A.
Kline, Mitchell H.
McFarlane, James C.
Reynolds, John R.
Snider, James J.
Rico Argentina Min. Co.
Hickok, Sherman B.
Rocky Mountain Machy. Co.
Buehler, F. Lloyd
Senior & Senior
"Senior, Clair M.
Shaft & Dev. Machines Inc.
O'Donnell, John C.
"Pierce, Rober V.
Shell Oil Co.
Woodward, Warren M.
Shenon & Full
"Full, Roy P.
"Shenon, Philip J.
"Thomas, Charles F.
Silver King Coalition Mines
Heitzman, Mearle G.
Sonoma Mining Co.
"Flint, Arthur E.
C. H. Spencer & Co.
Bachman, Roger O.
Standard Oil of Calif.
Kleinkopf, M. Dean
Sunshine Mining Co.
Eddy, Ernest E.
Techmanix Corp.
"Dawson, Harmel A.
"Mates, Robert R.
"Poormon, Delmer E.
Tintic Standard Min. Co.
Paine, Milton D.
F. C. Torkelson Co.
Huff, Ira S.
"Torkelson, Frank Christian
Union Assay Office Inc.
Sadler, J. V.
United Park City Mines Co.
Battie, Leslie K.
Droubay, Seth K.
U. S. Bur. of Land Mgmt.
Koch, Walter H.
Mudgett, Philip B.
U. S. Bureau of Mines
Clemmer, J. Bruce
Clemmons, Ballard H.
Everett, Floyd D.
Nau, L. L.
Nichols, Ivan L.
Plimpton, H. Gilbert
Wilson, Stephen R.
U. S. Geol. Survey
Hilpert, Lowell S.
U. S. Smelt. Ref. & Min. Co.
Ashurkoff, Boris
Barber, C. J.
"Billings, Thomas P.
Conrow, John M.
Ehrhorn, Jack M.
Gervels, Richard P.
Glaeser, Oscar A.
Henline, Cloyd H.
Hilton, Charles C.
Weagel, Robert C.
U. S. Steel Corp.
Brimley, Heber C.
Univ. of Utah
- "Belt, Charles B., Jr.
Clement, Stephen C.
"Cone, John H.
"Cook, Kenneth L.
"Eardley, Armand J.
Hoskins, John R.
Megerth, Frederic H.
"Nackowski, M. P.
"Stringham, Bronson
"Wedsworth, Milton E.
"Whelan, James A.

Utah-Washington

Uranium Reduction Co.
Lesse, John W., Jr.
Utah Mining Association
Horne, Walter M.
Romney, Miles P.
Utah Power & Light Co.
Mulcock, Wayne F.
Utah Salt Co.
*ap Roberts, Gwilym E.
Utah Sprocket & Mach. Co.
Inc.
*Barkley, Bill
H. J. Vander Veer & Assoc.
*Vander Veer, Howard J.
Vitro Corp.
Coleman, Robert B.
Ellis, Martell T.
Moore, James D.
*Schiff, Norman N.
Smith, Cecil H.
Young, Gavin H.
Wagner-St. Regis Paper Co.
Willert, Al A.
Western Coal Mining Co.
Schultz, H. J.
Western Machinery Co.
*Smith, Scott L.
Western Rock Bit Mfg. Co.
Hawkesworth, Maurice W.
Kittle, Percy H.
Siegel, Horace U.
Western States Oil & Metals
Co.
*Lyon, Paul C., Jr.
Westinghouse Electric Corp.
Hodgins, H. B.
Jones, J. N.
Lacher, Kari K.
Wilson Exploration Co.
*Wilson, Clyde H.
Worthington Corp.
Wilson, Paul E.
No Data Supplied
Alderman, S. S., Jr.
Allison, Bill
Arentz, S. S., Jr.
Austin, Charles L.
Bailey, Frank E.
Barker, Thomas, Jr.
Barrett, Soren A.
*Beeson, Joseph J.
Birch, Lockinvar B.
Ernest, Blessing
*Boutwell, John M.
*Breckon, L. S.
Brennan, James T.
Brewer, Quenton L.
Burwell, Blair T.
Bush, Giles F.
Carlson, T. R.
*Chaffin, Charles E.
Christensen, A. L.
Christensen, Carl H.
Christensen, N. S.
Christianen, E. W.
*Clarke, Roger W.
Clitheroe, Jay B.
Coan, B. G.
Condile, Bruce
Cook, C. C., Jr.
Crammer, Wm. H. H.
Curry, David H., Jr.
Davis, Logan E.
Davis, Thomas K.
Dempster, Anthony G.
Dubois, Max W.
Dugan, John F.
Earl, George C.
Eilers, K. Fritz
Engelmann, E. W.
Ensign, Horace A.
Felgenhauer, H. L.
Ferris, L. W.
Flatberg, Orrison M.
Friendly, Oscar N.
Gardner, J. R.
Gibbons, John P.
Gibson, Edgar G.
Godbe, M. C., III
Granger, Arthur E.
Green, Frederick C.
Griffith, W. A.
Gunnell, Farrell
*Hall, Newton L.
Hanna, Ernest V.
Hansen, Robert M.
*Hanson, Frederick W.
Heiner, Claude P.
Herrera, Otto
Hershey, Lewis G.
*Hood, K. K.
*Houston, Jack O.
Houghton, G. K., Jr.
Howes, Merwin H.
Hubbard, S. Jackson
*Hunt, Richard N.
Ivers, James N.
*Ivers, James, Jr.
Iverson, Melvin D.
*Jenike, Andrew W.
Johnson, E. S.
Jones, L. C.
Kintzinger, Warren H.
Knudson, Chas E.
Knudsen, John F.
Lamborn, B. Park, Jr.
Lippert, W. L.
Mabey, Douglas R.
MacGinniss, John

Mackenzie, A. G.
Mailinekrodt, Philip A.
Mallory, Roy E.
McKinney, A. A.
Meissner, Lee R.
Miles, Ned
Miller, Roswell, III
Moore, Edward J.
Moore, William C.
Morin, W. J.
Nault, W. J.
Nepper, John P.
Oldridge, G. L.
Oleary, Paul C.
Overfield, C. P.
•Palanch, Rollin A.
Parry, William T.
Pascoe, Richard F.
Passavant, C. R., Jr.
Peterson, J. L.
*Pinger, Allen W.
Pinkerton, R. G.
Portness, Robt. R.
Bains, L. E.
Ray, Otto A.
Regua, L. K.
Robertson, Daniel
*Root, Robert L.
Rosenblatt, Joseph
Ruddock, Merritt K.
Sackett, Blair L.
Saunders, David W.
Sharp, William
Shields, Paul L.
Shilling, J. D.
Sinclair, Carl W.
Snyder, David N.
Snyder, E. H., Jr.
Sontum, Christian
Sorensen, Paul M.
Starr, Robert P.
Stewart, Richard L.
Stoner, J. Wm.
Tallon, John F.
Thompson, R. B.
Thornburg, C. L.
*Tuck, Ralph
Van Evera, DeWitt
Van Wagoner, Theo. R.
Walkin, Harlan A.
*Wardlaw, Frank A., Jr.
Westerterp, Carl S.
Weitzel, N. F.
Weyher, Robert F.
*Whitney, L. Earl
Williams, Robert I.
Williams, R. M.
*Wormald, Bruce
*Wright, Theodore R.
Young, Earl B.

SANDY

No Data Supplied
Haug, L. J.

SPRING CANYON

Spring Canyon Coal Co.
Paulley, C. E.

SUNNYSIDE

Kaiser Steel Corp.
Farnsworth, Gial A.
Huntsman, Lynn P.
Morris, Lewis M.
Peperakis, John
Taylor, Joe T.
*Turner, Stephen F.
Wright, Wilmer C.

No Data Supplied
Hyatt, Vincent
McCourt, Thomas R.

TOOELE

Anaconda Co.
McAlister, Edgar O.
Ryan, George S.
Int. Smelt. & Ref. Co.
Cunard, Frederic G.
House, Orson E.
Kostello, George V.
McKenna, W. J.
Steinbach, Emile W.
McFarland & Hullinger
Erickson, Kenneth L.
Hullinger, S. R.
Utah Calcium Products Co.
Townsend, Byron E.
No Data Supplied
Broxholme, R. L.
Var Tate, L. A.

WATTIS

Lion Coal Corp.
Batchelor, De Lyle
*McAlpine, Earl H.

WELLINGTON

Columbia-Geneva Steel Div.
*Pressett, Eugene

VERMONT

HARRE
Rock of Ages Corp.
Ferris, Cyrus Y., Jr.
Gillette, Robert S.
Wall, Ernest Frank

BELLOWS FALLS

Foot Mineral Co.
Hudspeth, William R., Jr.

BRISTOL

Vt. Kaolin Corp.
Mould, Willis P.
Thurber, Richard B.
Umont Mining Inc.
Evans, Lewis P., Jr.
Eastern Magnesia Talc Co.
Magnus, William W.

WEST BRIDGEWATER

Norwich, Vt.
Farmers' Lime Co., Inc.
*Dwelle, Richard C.
No Data Supplied
Backels, Victor A.

VIRGINIA

ARLINGTON

No Data Supplied
*Grimes, John Alden

AUSTINVILLE

The New Jersey Zinc Co.
Albers, Walter L.
Brown, Horatio
Chaffee, Maurice A.
Paulson, Walter H.
Hannan, William S., Jr.
Knutson, Ray M.
Morgenstern, Carl G.
McNaughton, Clark H., Jr.
Tripucka, Paul
Vannoy, James L.

BIG STONE GAP

General Coal Co.
Shupe, James N.
Stonega Coke & Coal Co.
Jones, Wilmot C., Jr.
Schott, W. C.
Smith, W. Clifford
Strang, E. N.

BRISTOL

Enterprise Wheel & Car Corp.
Lahr, Robert W.
Castleberry, Douglas

DANTE

Clinchfield Coal Co.
*Corriveau, Martial P.
Hughes, Robert H.
Morris, Francis M.
*Stapleton, William A.
Sutherland, William H.

DUFFIELD

Foot Mineral Co.
Cooke, Walter E.
Kneass, George B., Jr.
*Anthony, Michael V.
*Hogan, Daniel J., Jr.
McKnight, James R.

GALAX

Allied Chem. Corp.
Green, William R.
*Nichols, James O.
Moore, Russell C.

KIMBALLTON

National Gypsum Co.
McDonald, Roderick G.
Nat'l. Gypsum Co.
Lekowski, C. Steven
Standard Lime & Cement
Tilmont, Carl C.

MARTINSVILLE

J. A. Gustin & Asso.
*Gustin, J. A.

MILLWOOD

Athione, Inc.
*Dunning, Archibald R.

NEWPORT NEWS

Union Carbide Ore Co.
Battle, Fred P.
U. S. Navy
Perkins, Grover S., Jr.

PINEY RIVER

American Cyanamid Co.
Craven, Carroll E.
Buffalo Mines, Inc.
Brand, Robert C.

PLASTERCO

U. S. Gypsum Co.
Connell, Robert P.
Decker, H. D.
Harmsen, Lynn

POCAHONTAS

Pocahontas Fuel Co.
Copeland, A. Eugene
Ferretti, Peter P.
Luther, Roland C.
*Porterfield, Charles W.
*Skewes, William J.

RICHMOND

Reynolds Metal Co.
Baumgardner, Luke H.
Chapman, R. T.
Dreyer, Robert M.
*Hart, Grant T.
Kidd, Edward
Micheli, Wilson D.
Moorman, Henry
Moses, John H.
Wimpfen, S. P.
Virginia-Carolina Chem. Corp.

ROANOKE

Farrell, Andrew A.
Heinrichs, Charles E.
Lone Star Cement Corp.
Fritts, Stewart S.
Sydnor Pump & Well Co.
*Hockman, Edwin L.
Ritchie, George G.
Soltice Corp.
Roberts, John W.

SALTVILLE

Olin Mathieson Chem. Corp.
Rapp, H. Clinton
Weaver, R. S.

STEPHENS CITY

M. J. Grove Lime Co.
Bass, Charles E.

STRASBURG

Chemstone Corp.
Falvey, Arthur E.

TAZEWELL

Jewell Ridge Coal Corp.
Alley, Marvin L.
*Bagenstose, Raymond M.
*Cothern, Leland I.
Kilgore, William D., Jr.
*McBurney, Eugene E.

TIMBERVILLE

Tristate Zinc Inc.
Hayes, Larry G.

WAYNESBORO

Gen. Elecric Co.
Reinhard, Fred P.

WISE

Thompson & Litton
*Litton, John W., Jr.

No Data Supplied—Va.
Gowen, Justin B.
MacKintosh, R. M.

*Watkins, Vernon L.
Reilly, James P.

*Anderson, Walter C.
Burgess, Dwight S.

Fruitman, E. W.
*Gardner, E. D.

*Holderer, George B.
DeHuff, G. L., Jr.
McMahon, A. D.

Frankenfeld, Wm. D.
Goin, Charles M.

Williams, J. P., Jr.

*Cooper, Byron Nelson
Fobeman, Wm. E.

Hamilton, Charles L.
*Holland, Charles T.

Huwang, William Minsheng

Lester, Edsel H.

Shelton, Carl, Jr.
Pero, J. W.

Calver, James L.
Case, Albert H.
McGill, William M.
Joslin, Richard E.

Brackett, William R.

*Wyson, Rufus

Scholla, Paul F.

Newman, S. M., Jr.

Ristedt, Ernest J.

Hawkins, F.

*Marlin, John D.

Phillips, P. B.

Huddie, Chas. R.

Munro, Philip K., Jr.

East, William F.

*Wells, Thomas L.

Malesky, Joseph S.

Cox, Ralph S.

Kite, James W.

*Crouse, Leon F.

*Bunn, Clinton O.

*Forester, Max H.

Ellers, Thomas E.

*Prosser, Fred K.

Robertson, Franklin

Connelly, C. F.

McDonell, A. J.

Thompson, Wm. A., Jr.

WASHINGTON

AUBURN

No Data Supplied
Lindberg, Russell A.

BELLEVUE

No Data Supplied
Strandberg, T. R.

BOTHELL

No Data Supplied
Wadsworth, Dean

BUCKLEY

Cameron A. Rich Assoc.
*Rich, Cameron A.

BURIEN

No Data Supplied
Langness, Oren O.

BURTON

No Data Supplied
Billingsley, Paul

CASHMERE

No Data Supplied
Lee, J. P.

CHELAN

No Data Supplied
Phillips, Wellington S.

CHEWELAN

N. W. Magnesia Co.
Fisk, Roger L.
Endrice, Barney
Ziebell, A. Howard

No Data Supplied
Goodman, D. W.
Lovejoy, Victor E.

COLFAX

No Data Supplied
Schierman, Gerald L.
Amer. Smelt. & Refin. Co.
Paparich, Frank M.

COLVILLE

Goldfields Cons. Mines Co.
Higginbotham, T.
Swan, Willis A., Jr.

DAVENPORT

No Data Supplied
Thompson, V. N.

EVERETT

Mod Home Builders Inc.
Gonnason, Walter L.

FORD

Dawn Min. Co.

*Darlington, William H.
Payne, Keith E.

Pike, James A.
Stucker, Paul E.

*Wilson, James W.

FORT LEWIS	RÉPUBLIQUE	THEIS, ARTHUR J.	ROBINSON & ROBERTS	WASHINGTON-WEST VIRGINIA
U. S. Army McGuire, Michael D.	Knob Hill Mines Inc. Patterson, Allan R. No Data Supplied Houglund, Everett P.	Williams, Lewis Wilson, Edmund G. Wimmer, Norman L.	*Fryberger, John S. Tassone Test Lab. *Jeklin, Lewis E.	CANNELTON
FRIDAY HARBOR			No Data Supplied	Cannelton Coal & Coke Co. Morton, Paul
No Data Supplied *Green, Stephen H.			*Benson, Paul T.	CAPELLES
GREEN ACRES			*Bissett, David H. Bowman, Robert A. Gordon, Harold F. Jackson, R. O. Somerville, David A.	New River & Pocahontas Cons. Coal Co. Gardner, Randall A.
No Data Supplied Patterson, L. A.				CENTURY
MUKILTEO				Bethlehem Mines Corp. Tokarczyk, Stanley G.
No Data Supplied Melrose, J. W.				CHERAD
KENNEWICK				Oglebay Norton Co. *Bishop, Jack M. *Hicks, Harold N.
Calif. Spray Chem. Co. Rosene, Carl J.				CHARLESTON
LONGVIEW				Superior Coal Co. *Beattie, Harold L. Kanawha Mfg. Co. Carver, George E. Crab Orchard Coal & Land Co.
Reynolds Metals Co. Neatherly, Thornton L.				*Clark, James M., Jr. Dickinson Fuel Co. Inc. Dickinson, Charles C. United Fuel Gas Co.
LOPEZ				*Ferenz, Arthur M. *Frederick, Eugene Melvin Liberty Eng. Co. *Gentry, William S. Amherst Coal Co.
No Data Supplied Banks, Robert T.				Hopkins, A. S. J. Jones, Herbert E., Jr. Commercial Test & Engrg. Co.
MAPLE FALLS				Lindsay, Kenneth E. W. Va. Dept. of Mines Lingo, Paul C.
Permanente Cement Co. *Wilson, Glen B.				McCormick Engrg. *McCoy, Julius M. Robinson & Robinson *Robinson, Carol *Robinson, Neil
MARSHALL				No Data Supplied Smith, Venerar C. Carbon Fuel Co. Thomas, L. N.
No Data Supplied *Orlard, Lewis L.				CLARKSBURG
MERCER ISLAND				Hope Natural Gas Co. Schrader, Bruce P. The Texas Co. Tetrick, Richard F.
Haaland & Hoskins Assoc. *Haaland, Otto E.				COALBURG
METALINE FALLS				Oak Dev. Co. *Willis, John A., Jr.
Amer. Zinc & Lead & Smelt. Calhoun, William M. Currie, John W. Lampeen, Richard J. J. Shellenberger, Floyd H. *Underwood, Delos A. Lehigh Portland Cem. Co. Clayton, Austin B. Pend Orielle Mines & Met. Co. *Crampton, Jack C. *Kinney, Lindsay M.				COALWOOD
MONROE				Olga Coal Redfearn, Donald F. Ridgenour, David C. Servant, J. Emil *Waine, Charles R.
No Data Supplied Knudsen, Brede				DEHUE
MOUNTLAKE TERRACE				*Jolly, Edward B.
No Data Supplied Huber, Thomas N. Patterson, Alex Wash. Div. Min. & Geol. Hunting, Marshall T.				DUNDON
OLYMPIA				Elk River Coal & Lbr. Co. Bradley, J. G.
Dept. of H'ways *Ford, Donald M. No Data Supplied Bennett, W. A. G. Fidler, Clarence H.				FAIRMONT
OSTERVILLE				Mountaineer Coal Co. Belton, Arthur E. Conrad, Chester S. *Gillley, James E. Higinbotham, George R. Judy, George L. Kinell, K. Kenneth *Washburn, Harry L. *Yeloushan, Charles C.
No Data Supplied Thompson, Glenn L.				Fairmont Mach. Co. Forman, James W. Houston, David W. Bethlehem Mines Gray, Latham B., Jr. Monongahela System Potter, Don B.
PORT BLAKELEY				FORT SPRING
No Data Supplied *Earling, Roy B.				Acme Limestone Co. McThenia, W. A.
PULLMAN				GARY
Wash. State Univ. *Crosby, James W., III *Jaeckel, John A. Kraus, Howard G. *Masson, Donald L. No Data Supplied Burns, Robert D. Culver, Harold E.				U. S. Steel Corp. Anderson, John C. Anderson, Robert B. Bloomberg, James M. Boyle, Francis R. Caffrey, John E. Connor, Chas. W., Jr. Gillison, Geo. T.
PUYALLUP				
No Data Supplied Judy, John W. Hammermeister, E. A.				
RENTON				
Gladding McBean & Co. *Clark, Ralph I. *Holmes, David A. Boeing Ap. Co. *Davidson, Harold O.				
SOCIETY OF MINING ENGINEERS OF AIME				

West Virginia-Wyoming

*Harman, Harry E.	The New River Co.	WILLIAMSON	Pickards Mather & Co.	No Data Supplied
Hayduk, Martin	*Bourland, Charles R.		Swanson, Arden W.	Magnuson, George R.
Slover, Frederick R.	U.S. Bureau of Mines	JANESVILLE		OCONOMOWOC
*Steen, Walter H.	*Fitzgerald, G. Lloyd		No Data Supplied	No Data Supplied
*Walrod, Gordon H.	MOUNT HOPE	WYCO	Mouat, Malcolm M.	*Buchner, Carl F.
Watson, Paul E.	Gulf Mining Co.	Amigo Smokeless Coal Co.	KENOSHA	ONRO
*Yurick, Charles	Graney, Patrick C.	Williamson, Robt. B.		No Data Supplied
GRANT TOWN	*Howard, Thomas W.	WYOMING	MacWhyte Wire Rope Co.	Stiller, Orland F.
Eastern Gas & Fuel Asso.	NEWELL	W. M. Ritter Lumber Co.	*Williams, Geo. T.	PLATTEVILLE
Basile, Joseph C.	Globe Brick Co.	Glover, Charles L.	MADISON	The N. J. Zinc Co.
HOLDEN	*Lee, Richard W.	No Data Supplied—W. Va.	One Blasting Service	Zwickley, Wayne R.
Island Creek Coal Co.	NETTIE	Honaker, H. R.	*Ong, John S.	Piquette Min. & Milling Co.
Camicia, N. T.	Sewell Coal Co.	Scott, Dennis K.	Univ. of Wisconsin	Piquette, F. B.
Hodder, Ed J. Jr.	Spotte, Irving	Caudill, L. V.	Autista, Renato G.	Wisc Inst. of Tech.
*James, L. Yak	OAK HILL	Hogue, Andrew O. B.	*Clark, Lewis Donovan	*Broughton, W. A.
*Menk, Ferdinand C.	Cedar Creek Ming. Co.	Putman, L. I.	*Ostrom, Meredith E.	*Gronbeck, Marius P.
Petzold, Adolph W.	Hurley, Victor L.	Dux, Herbert E.	*Scott, James J.	*Palmer, Harris A.
Strunk, Thurston H.	OSAGE	Gillie, Percy	*Tiemann, Theodore D.	No Data Supplied
HUNTINGTON	Christopher Coal Co.	Morrison, James M.	Cameron, Eugene N.	Hague, John M.
Assoc. Engrs. Inc.	Fowler, Cleon R.	Warden, Henry F.	Mertoogan, Akgun	Henry, Russell P.
Chedsey, George L.	Miller, Fred H.	Browning, Guy	Kowalke, Otto	Jones, A. A.
Island Creek Coal Sales Co.	Nailier, Charles R.	Cree, J. O.	Sonnees, Ahmet	Mullens, Thos. E.
Doherty, Joseph D.	RALEIGH	Miller, James W.		
Hamilton, J. L.	Raleigh Coal & Coke Co.	Nash, Edgar		
Lazzell, R. Glenn	*Burmeister, R. J.	Stasch, Franklin E.		
Salvati, Raymond E.	RAVENSWOOD	Correll, Charles S.		
Logan & Kanawha Coal Co.	Kaiser Alum. & Chem.	Berry, C. E.		
Fields, John R.	Engskow, John B.	Hilton, W. T.		
Princess Coals, Inc.	RICHWOOD	Kolwey, Herman G.		
Francis, David L.	Donegan Coal & Coke Co.	Monell, Louis F.		
Spotte, Adler E.	McQuade, Joe L.	Prunty, M. E., Jr.		
Chesapeake & Ohio Rwy. Co.	ST. ALBANS	Williamson, Norman L.		
*Gaddy, Frank L.	J. M. Huber Corp.	Anthony, Zona		
Herring, J. Byron	Griffith, Robert F.	Preston, Jordan E.		
McDaniel, W. Darrell	RHARPLES	King, Donald T.		
Ingersoll-Rand Co.	Boone Ct. Coal Corp.	Whitehead, James B.		
Haase, Conrad C.	Toler, Vivian D.	Laird, William		
Sycamore Coal Co.	Wesner, Richard F.	Howard, Charles N.		
Hamill, Charles A.	SLAB FORK	*Lawall, Charles E.		
Link-Belt Co.	Slab Fork Coal Co.	Stevens, David W.		
Lammers, Kenneth M.	Caperton, S. Austin	*Von Stroh, Gerald F. H.		
Mills, Edward L.	SO. CHARLESTON	Younger, J. J.		
Mitchell, Charles R.	Allis Chalmers Mfg. Co.	*Reece, Philip P.		
Mott Core Drill, Co. Inc.	Rees, Thomas B.	Ruby, W. H.		
*Mott, B. H.	TAMS	Milam, Marcus L.		
B. H. Mott & Sons, Inc.	Winding Gulf Coal, Inc.	Davis, John E.		
Mott, Burton H., Jr.	Bowman, Ernest V.	Stanley, Charles E.		
Acme Machinery	THOMAS	Gillenwater, J. B.		
Perseinger, John A.	Western Md. R'way Co.	Muelier, Louis J.		
Goodman Mfg. Co.	Sacher, L. J.	Neely, Forest H.		
Peterson, Leonard W.	*Wooters, Robert B.	Van Evera, J. W.		
Dingess-Rum Coal Co.	TRALEE	Kane, C. O.		
Stark, Tom	Allied Chem. Corp.	Adkins, Lowell E.		
Coal Land Services, Inc.	Dado, Ralph J.	Bernard, Wm. O., Jr.		
*Stark, Wm. D.	TRIadelphia	Sharpenberg, H. D.		
LILLYBROOK	Valley Camp Coal Co.	Keppish, Edward		
Lillybrook Coal Co.	Cunningham, David S.	McCas, George W.		
Carter, James D.	Haake, Donald R.	Bourland, White		
Crickmer, Harold E.	WEIRTON	Stortz, Frank J.		
LOGAN	National Steel Corp.	Long, John B.		
U.S. Bureau of Mines	Beale, Louis C.	Bower, Arnold B., Jr.		
Whalen, James T.	Dietz, J. Reginald	Oppermann, A. J.		
LORADO	*Nash, Julian W.	Stewart, Fred F.		
The Lorado Coal & Min. Co.	Weirton Steel Co.	Flippin, C. J.		
*Bobella, John C.	Dougherty, Sylvester J.	Bay, Neil Elwyn		
Straton, John W.	WHARTON	Pugliese, Louis T.		
Crawford, William	No Data Supplied	Brady, S. D., Jr.		
MARMET	Patzig, P. R.	Brady, S. D., III		
Eastern Gas & Fuel Asso.	GREEN BAY	Pudio, George H.		
Johnston, James C.	No Data Supplied	Reedy, Donald M.		
MARTINSBURG	*Sweetman, Edwin	Smith, V. C., II		
Jones & Laughlin Steel Corp.	HUDSON	WISCONSIN		
Alter, George E., Jr.	No Data Supplied	BENTON		
Stand. Lime & Chem. Co.	Patzig, P. R.	No Data Supplied		
Craig, Irving M., Jr.	WEIRTON	FARREY, Henry B.		
MONTGOMERY	National Steel Corp.	Nulph, Dennis E.		
Allied Chem.	Beale, Louis C.	CECIL		
Noone, William H.	Dietz, J. Reginald	No Data Supplied		
MORGANTOWN	*Nash, Julian W.	BOCHER, Robert J.		
Jeffrey Mfg. Co.	Weirton Steel Co.	CEDARBURG		
*Schilibe, Carl G.	Dougherty, Sylvester J.	No Data Supplied		
F. R. Zachar & Assoc.	WHARTON	MOLDENHAUER, M. I.		
*Zachar, F. R.	No Data Supplied	FENNIMORE		
West Virginia Univ.	Patzig, P. R.	No Data Supplied		
*Ludlum, John C.	GREEN BAY	JAMES, Richard P.		
*McClung, Joseph D.	Greenland Coal Sales, Inc.	No Data Supplied		
*Spindler, Garold Ralph	Burt, Wm. L.	*Sweetman, Edwin		
Stahr, Elvis J. Jr.	Wheeling Steel Corp.	HUDSON		
W. Va. Geol. Survey	Davis, E. Tyler	No Data Supplied		
*Price, Paul Holland	Whitaker, Albert C., Jr.	Slaughter, William F.		
MOUNDSVILLE	WIDEN	HURLEY		
Hanna Coal Co.	Elk River Coal & Lumber Co.	ODANAH IRON CO.		
Goddard, William P.	Ketchka, Edward R.	CAREY, Bernard W.		
*Sarf, C. Lionel		JOSE, Russell L.		

FRONTIER

The Kemmerer Coal Co.
*Sorensen, G. E.
Townsend, David H.

GAS HILLS

Union Carbide Corp.
Lentz, Kendrick W.

GREEN RIVER

Intermountain Chem. Co.
*Hash, Bender
Bernatis, Thomas S.
Fischer, William G.
*Van Denberg, James F.
No Data Supplied
Coulon, James W.

HOME ON THE RANGE

Western Nuclear Corp.
Fuller, B. J.
No Data Supplied
Fairervis, R. J.

HULETT

Homestake Mining Co.
Connolly, Thomas J.

JEFFREY CITY

Green Mountain Uranium Corp.
Walkup, Albert C.
Western Nuclear, Inc.
Newman, Eric
Smith, Marcellle H.
No Data Supplied
Braden, Howard H.

LANDER

Green Mountain Uranium Corp.
Clark, Elton
Risch, Eugene E.
Minerals Engineering
*Larken, Terence P.

LARAMIE

Union Pac. Min. Dev.
*Simons, John P.
Thomas, Nelson G.

UNIV. OF WYO.

*Duncan, Walter E.
*Frostel, Edward
*Wilson, William H.
No Data Supplied
Bellamy, Ben C.

LOVELL

Nat'l Lead Co.
Castelli, August V.
Sturgeon, David A.

RAWLINS

Western Nuclear Corp.
Cenis, Donald L.
Joyce, Joseph W.
*Knocke, Louis C.
Thomas, Peter N.
U.S. Atomic Energy Comm.
Meschter, Daniel Y.
No Data Supplied
Adams, Robert W.

RIVERTON

Federal Partners
Lindlof, Raymond G.
Fed-Raderrock-Gas Hills
Partners

FRANCO, HORACIO A.

Norman, Hubert W.
R. Ford & Assoc.
*Ford, Robert B.
*Webber, Kenneth J.
Globe Min. Co.

Bagan, Richard J.
Guillinger, Robert R.
Taylor, Robert
Wyatt, Franklin W.

Hidden Splendor Min. Co.
Akright, Robert L.
*Wolf, Fritz E.

Lucky Mc Uranium Corp.

Anderson, Don C.
Anderson, John S.
Atkins, John T.
Pratt, Morton E., Jr.

*Price, Theodore O.
Ritchie, M. I.
Parker & Parker

*Parker, Robert F.
Shoshone Ore Co.
Moore, Irving F.

Susquehanna-Western
*Bryant, Garret H.
Davis, James F.
Utah Construc. & Min.

Davis, John P.
*Henritze, Thomas K.

Wyoming-Wyoming

Pimentel, J. E.
*Quine, Albert V.
Utah Mining Corp.
Rackley, Ruffin I.
Vitro Minerals Corp.
Adamson, Robert D.
Coulson, Roy
No Data Supplied
Bullock, G. Eugene
Miller, Robert A.
Nobs, Ken
Scott, Marshall W.

ROCK SPRINGS

Union Pacific Coal Co.
*Charols, Iestyn M.
Murray, Vernon O.
No Data Supplied
Hughes, John B.

SUNRISE

Colo. Fuel & Iron Corp.
Erickson, Neil E.
Lynch, Hugh B.
MacCannon, Robert W.
Simon, Myron L.
Wahl, Roy L., Jr.

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Chem. Res. Lab.
Wark, Ian W.
Consol. Zinc Pty. Ltd.
Mawby, Maurice A.
Nixon, John C.
Cyanimid Aus. Pty. Ltd.
Ashon, Bruce E.
Jackson, Norton
O'Malley, Godfrey B.
Electro. Zinc Co.
Hey, Harry
Emperor Gold Min. Co.
Nilsen, Nile Emil
Mary Kathleen Uranium Ltd.
Keast, Astridus James
Personnel Admin. Vic. Ltd.
Smith, Jack Stanley
Rio Tinto Min. Co. Pty.
*Dickinson, Samuel Benson
Fitzgerald, Martin L.
Western Min. Corp.
Clark, G. Littlesay
Eagle, Frank F.
No Data Supplied
*McKeown, Maurice R.
*Garrett, M. Duhan
Marks, Harry

PARKVILLE

Univ. of Melbourne
*Carr, John Stewart

NIDDRIE

Caterpillar of Aust. Pty.
Donald, Ian A.

BALLARAH

No Data Supplied
Restarick, C. J.

MOUNT MORGAN

No Data Supplied
Shell, Glenister

SOUTH AUSTRALIA**ADELAIDE**

Broken Hill Prop. Co.
Kleeman, R. T.
S. A. Inst. of Tech.
Hill, Malcolm

PORT PIRIE

No Data Supplied
Hopkins, Robert J.

WHYALLA

Broken Hill Pty. Ltd.
Burger, Dionys
Salamy, S. G.
*Whitehead, Robert C.

WINGFIELD

Comix Ltd.
Barclay, Thomas C.

W. THEBARTON

Dept. of Mines
Keats, Arthur L.

TASMANIA

King Is. Scheelite Ltd.
*Cameron, Ian D.

HOBART

No Data Supplied
Kirby, Noel

QUEENSTOWN

Mt. Lyell Min. & Rly. Co.
Stephens, Desmond C.

ROSEBERRY

Electrolytic Zinc Co.
Hall, Graham

WEST AUSTRALIA**ALBANY**

No Data Supplied
Wittenoom, Chas. H.

COMO

No Data Supplied
*Ward, Hector J.

COTTESLOE

No Data Supplied
*Utting, Edward P.

DALKEITH

No Data Supplied
Greig, Ernest Howard

KALGOORLIE

Lake View & Starr Goldmine
Kozuh, Danilo

YAMPI

Aust. Iron & Steel Pty.
Sheppard, Rodney T.

NEW ZEALAND**AUCKLAND**

No Data Supplied
Rhodes, Fred N.

DUNEDIN

Ministry of Works
*Gordon, Francis R.

No Data Supplied
Fairmaid, Gordon H.

MAPUA

Lime & Marble Ltd.
Braithwaite, John C.

MARLBOROUGH

No Data Supplied
Pickering, Bruce R.

INDONESIA**DIJAKARTA**

No Data Supplied
Simmons, Philip W.

FIJI ISLANDS**SUVA**

Fiji Gov't
Kennedy, Errol M.

No Data Supplied
*Fleischman, Karl R.

VATUKOULA

Emperor Gold Mines Ltd.
Cohen, E. M.

CROWLEY

No Data Supplied
Rapadzi, Albert

NOUMEA**NEW CALEDONIA****WAU**

Div. of Mines
Trestrall, Hugh A.

PHILIPPINE ISLANDS**ACOJE**

Acoje Mining Co.
Reed, A. Roy

Shaner, L. W.

BAGUIO

Benguet Cons. Inc.
Botelho, John B.

Crosby, R. W.
Davidson, Arthur P.

Farretta, Alvin J.

Field, George E.

Iten, Ken W. B.

Martin, Laurence Pethick

Matus, Angel L.

Miley, John W.

Morrison, Lee G.

*Nedwick, Harry E.

Pearson, W. J.

Plosser, Alan P.

Respicio, S. Z. Jr.

Roberts, Adrian J.

Smith, Donald A.

Itogon-Suyoc Mines Inc.

Collins, John C.

*Fertig, Claude E.

Hull, Raymond E.

*Mendoza, Elias R.

Philex Mining Corp.

Fonce, Moises I.

CAHANGAN

No Data Supplied

Completo, Lazar

DAVAO CITY

Elizalde & Co.

Ybañez, Alfonso S.

LARAP

Philippine Iron Mines Inc.

Bela, Domingo S.

Cayabyab, Thomas A.

Cuyugan, J. D.

*Frost, John E.

Peralta, Tobias R.

Prieto, Quintin S.

Tanchuling, Antonio

Uriarte, M. H.

LEPANTO

Lepanto Cons. Min. Co.

Abalos, Toodilo Q.

Brown, Henry E.

Dashers, Laurence A.

De Guzman, Felipe

Dunkie, Ralph M.

Foster, Charles B.

Franco, E. B.

MANILA

Atlas Cons. Min. Dev. Corp.

Ross, Karel

Benguet Con. Inc.

Callow, X. J.

Hassermann, John W.

Roblin, A. N.

Elizalde & Co.

Duboulay, Geo. M.

Veiguth, A. G.

SANTA CRUZ

Acoje Mines

Mikkelsen, Gunnar M.

SURIGAO

Surigao Cons. Min. Co.

Heide, Harold E.

Victoria-Philippine Islands

Franklin Baker Co.

Muehl, Wallace W.

Hapua Inst. of Tech.

*Sancianco, G. V.

Honolulu Iron Works

Thormeyer, W. Richard

Koppell Phil. Inc.

Pickard, Joseph W.

Manila Mining Corp.

*Mitke, Chas. A.

Marsman & Co.

Lavroy, Sergey E.

Philex Min. Corp.

*Pessin, Albert L.

Schooley, George A.

P. I. Min. Expl. Inc.

Tavela, Matti S.

Rep. Res. & Devel. Corp.

*Sison, Carmelo T.

Rizal Cement Co.

Mendoza, Manuel S.

Samar Min. Co.

Lagaga, Generoso C.

Soriano & Co.

Hillebrand, James R.

Lewis, Dan E., Jr.

Univ. Cement Co.

Gapsud, Honestio A.

No Data Supplied

Fittinghoff, N. A.

Montero, Nestor O.

*Newman, George H.

Valmores, Lope M.

MANKAYAN

Itoen Suyoc Mines

*Smit, Walter J.

MASINLOC

Benguet Consol. Inc.

Charlot, Leon E.

QUEZON CITY

No Data Supplied

Lim, H. N.

SAN JUAN

Hidalgo, I. O.

SAN VICENTE

P. I. Mineral Expl.

Ramirez, David R.

SANTA ANA

No Data Supplied

Recolizado, R. R.

SANTA CRUZ

Acoje Mines

Mikkelsen, Gunnar M.

SURIGAO

Surigao Cons. Min. Co.

Heide, Harold E.

FOREIGN

NORTH AMERICA	No Data Supplied	*Schumacher, John I.	WABANA	COPPER CLIFF
CANADA	Mahan, Robert B. McIntosh, J. S.	Spry, Russell J. Steiner, Robert R. Siro, Wm. M.	Dominion Wabana Ore Ltd. Padden, Roy H. Southey, Victor J.	Int'l Nickel Dev. Co., Ltd. Bernard, Frederic De Vletter, De Robert Gaetz, T. M. Lee, James E. McCreedy, John
ALBERTA				Mutz, Herman, James Pigott, John A. Poll, Jay A. Stoneman, Earl G. Taylor, R. R.
CALGARY				No Data Supplied
Alberta Coal Ltd. *Blackstock, William J. Doerr, Charles F.	Kennametal, Inc. Stoll, William M.	B. C. Dept. Mines & Petr. Resources Sargent, T. E. Hartley	WABUSH LAKE	Frame, G. A. Thores, George M. Zurbrigg, H. F.
No Data Supplied	Reeves Mac Donald Mines Thompson, Robert		WHITE ROCK	
Brusett, John A. Corey, B. H. Diamond, Ralph W. Kent, A. F. Munn, Thomas H.	REMAC	No Data Supplied		
	REVELSTOKE	Huestis, Herman H.	NORTHWEST TERRITORY	
	Mastodon Zinc Mines Ltd. Laird, Alexander M.		YELLOWKNIFE	
EDMONTON	ROSS LAND		Cors. Mines Clayton, George F. Giant Yellowknife Gold Mines Ltd.	
Univ. of Alberta *Leja, Jan Lilje, E. O. Peterman, Zell E.	No Data Supplied Armstrong, Robt. J.	San Antonio Gold Mines, Ltd. Reynolds, Geo. F.	Davey, J. F. Irvine, Donald J. Kerns, Brian Tait, Robt. J. C.	
FORT SASKATCHEWAN	SALMO		MANITOBA	CUTLER
Sherritt Gordon Mines Ltd. Evans, David J. L.	Canadian Explor. Ltd. Steane, Harold A. Weber, Robert G.		NOVA SCOTIA	Noranda Mines, Ltd. Morrison, Bernard H.
LETHBRIDGE	SALT SPRING ISLAND		HALIFAX	DOBIE
Lethbridge Collieries Ltd. *Livingstone, R. Donald	No Data Supplied Bates, Bennett R.		Nova Scotia Technical College *Cameron, E. Lee	Upper Canada Mines Hunt, Myron F. S. No Data Supplied Waterland, T. M.
OKOTOKS	TOBY CREEK		No Data Supplied Mackenzie, T. George	DON MILLS
Texas Gulf Sulphur Co. Ronicker, Fred J.	Sheep Creek Mines, Ltd. *Allen, Thomas J.			McPhar Geophysics, Ltd. Hall, Philip G. *Robinson, Wm. A. *Sutherland, Don B.
BRITISH COLUMBIA	TRAIL			No Data Supplied Clifton, Frank Evans, Howell T.
ALICE ARM	CONS. MINING & SMELTING CO.		SYDNEY	ELLIOOT LAKE
Torbit Silver Mines Ltd. *Bapt, Harry	Campbell, Douglas S. Campbell, Thomas Douglas		Dominion Coal Corp. Ltd. Sigut, George Dominion Steel & Coal Corp. Frost, Louis	Algoma Nordic Mine Jackson, M. E. Denison Mines, Ltd. deBastiani, Mario J. Northspan Uranium Mines, Ltd.
BEAVER COVE	HODGSON, STANLEY			
Nimpkish Iron Mines Burns, David W.	McNaughton, Ronald R. Teifer, Leonard Walton, Thomas F.		WALTON	
BRITANNIA BEACH	No Data Supplied Bloomer, P. T.		Magnet Cove Barium Co. Hamilton, R. E.	
Howe Sound Co. Sadar, Edward S. Smith, Archibald T.	VANCOUVER		ONTARIO	
CASSEAR	B.C. ENGINEERING		ALGOMA MILLS	
Cassiar Asbestos Corp. Bronson, Charles E.	*Weymark, William James Bracco, Ltd. Taylor, Austin C.		Pronto Uranium Mines, Ltd. Karim, Inayat	
CHAPMAN CAMP	CANADIAN EXPLOR. LTD.		ATIKOKAN	
No Data Supplied Ruffle, James A.	GORDON, GERALD A. Chapman, Wood & Griswold Ltd.		Caland Ore Co., Ltd. Bishop, Michael R. L. Peterson, E. Warren Ribotti, Peter P.	
COPPER MOUNTAIN	*Chapman, Edward P., Jr. *Perelli, Richard J. R. C. Clough Eng. Ltd.		Construction Aggregates Corp. Pascal, Norman P.	
No Data Supplied Ross, J. A. C.	*Cohen, Harvey H. Columbia Gypsum Co., Ltd. Hilchey, Gordon R. Dolmage, Mason & Stewart, Ltd.		Steep Rock Iron Mines *Samuel, Watkin	
GREENWOOD	Field, William E. Granby Mining Co. Ltd. Postle, Lawrence T.		No Data Supplied Magee, J.	
Cons. Woodgreen Mines *Adams, William S.	HIGHGARD BELL, LTD.		BALMERTOWN	
KELOWNA	Crowhurst, John J. *Kidd, Desmond F. Hill Starck & Assoc.		New Dickenson Mines Ltd. *Buchholz, Donald H.	
No Data Supplied MacKenzie, W. J.	*Starck, Louis P.		Fell, Fred A. H. G. Young Mines Young, Horace G.	
KIMBERLY	NEWMONT MIN. CORP. OF CAN.		BANCROFT	
C. Mand Co. of Can. Ltd. Robertson, Allon G. Consoi Ming & Smelt Co. Gibney, Wilfalm H. R. Giegerich, Joseph R. Hammond, H. Robert	Cannon, Donald M. Norman, George W. H. Noranda Explor. Co. Ltd. Bryneisen, B. Burton, Alex D. K.		Bifroft Uranium Mines Ltd. Lillie, Douglas F. Thompson, John M. Thomson, Barton A.	
No Data Supplied Trenaman, R. T.	Placer Dev. Ltd. McClelland, Thomas H. Simpson, John D. Phelps Dodge Corp. of Can. Ltd.		Paraday Uranium Mines Roach, R. J. Canadian Dyno Mines Warren, Clayton E.	
COMINCO	DeLeen, John L. Univ. of B. C.		BEAUVILLE	
No Data Supplied Sevensma, Pieter H.	*Forward, Frank Arthur Howard, Henry M. *Warren, Harry V.		No Data Supplied Dies, George D.	
LUND	Ventures Ltd.		BEARDMORE	
No Data Supplied *Lorain, Sinclair H.	*Smith, Alexander Wright Engineers Ltd.		Leitch Gold Mines Ltd. *McKay, George A.	
MERRITT	*Wright, Leonard F.		BRIGHTON	
Birkett Creek Mine Operators, Ltd. Anderson, John M.	No Data Supplied Coveney, C. J. Dobson, Percy G.		No Data Supplied *Fox, Campbell	
NELSON	*Guernsey, Tarrant D. *Hales, Heath H. *James, Howard T. McDougall, B. W. W. Nelson, W. I.		ST. LAWRENCE	
Sheep Creek Mines Ltd. Doelle, Henry E.	*Neabit, Bertram I. O'Brien, Melbourne McKim		St. Lawrence Corp. Ltd. Poynter, Donald A.	
	Parentus, Edward B. *Roper, F. Cecil Rotherham, Donald C.		TILT COVE	
			Maritime Min. Corp. Ltd. Perry, Edward J. Busse, Egon	
			COCHENOUR	
			Cochenour Wiliams Gold Mines Ltd. Reid, Stewart M.	
			HAILEYBURY	
			No Data Supplied Thoddy, Gerald P. Atchison, Daniel W.	

North America-North America

HAMILTON	ORILLIA	SOUTH PORCUPINE	Fagersta Steels, Ltd.	Stearns-Roger Engrg. Co. Ltd.
Dom Foundries & Steel Co. Loosley, Fred A.	Dorr-Oliver-Long, Ltd. McVeigh, Hamilton G.	Dome Mines, Ltd. Girdwood, Charles F.	Arvidson, Ernest A.	Croome, Norman C.
Steel Co. of Canada Ltd. Chisholm, Jack T.		Preston East Dome Mines, Ltd.	Falconbridge Nickel Mines Ltd.	Sulmac Expl. Services
HOLTYRE	OTTAWA	*Lane, Harry C.	Archibald, Frederick R.	*Gledhill, Thomas R.
Ross Mine Taylor, R. D.	Canadian Gov., Dept. of Mines & Tech. Survey	Frobisher, Horace J.	Fraser, Horace J.	Grant, Gerald W.
JAMESTOWN	Buck, W. Keith	Mitchell, Geoffrey P.	Frobisher, Ltd.	Teck-Hughes G. M. L.
Algoma Ore Prop. Ltd. James, C. Roy	Elver, Robert B.	Edward, Bruce G.	Keevil, Norman B.	Terratect Co., Ltd.
ISLINGTON	Hayslip, Gordon O.	Walker, W. B. G.	*Fowlson, J. M.	*Powerson, J. M.
No Data Supplied Elliott, Robert A.	Ignatieff, Alexis	Gardner Denver Co., (Canada)	Univ. of Toronto	Cox, Geoffrey A.
*Wigle, George P.	Pickett, Daniel E.	Ltd.		Haultain, H. E. T.
KASHABOWIE	Reeves, John E.	Henderson, John R.		Moore, Elwood S.
North Coldstream Copper Mine	Smith, Harold Wm.	Gen. Engrg. Co. Ltd.		*Rice, H. R.
Morgan, D. M.	Woodroffe, Henry M.	*Bourke, D. E.		*Ross, Henry U.
KING	Wyman, R. A.	Fredenburg, William		Urick, Currie, Ltd.
No Data Supplied Evans, John H.	Carleton Univ.	*Hamilton, P. D. P.		*Sloan, Douglas A.
KINGSTON	*Riddell, John Evans	*Hamilton, R. M. P.	Ventures, Ltd.	
Aluminum Laboratories Ltd. Hay, Robert H.	Eldorado Mining & Ref. Ltd.	Halet, Brookhurst & Ogden		*Dunn, William
Queens Univ.	Barret, Richard E.	*Ogden, Michael		*Haw Vitoor A.
*Corlett, Albert V.	Bennett, W. J.	Harding, Co. Inc.		McGowan, Henry S.
KIRKLAND LAKE	*Thunser, A.	*Robinson, Bertrand		Salt, Donald J.
Wright Hargreaves Mine Hotchkiss, M. W.	Int. Min. & Chem. Corp. (Can.), Ltd.	J. C. Honberger, Ltd.	Victoria Co. of Canada	Morgan, George
LAKEFIELD	Hood, Walter H.	*Honberger, Jack Carlton	MacMillan Viola R.	Viola Mac Mines Ltd.
Lakefield Res. Canada, Ltd. Allen, Jules P.	Meredith & Finlayson	Hopkin Mining Cons., Ltd.	Westfield Minerals, Ltd.	Lindsey, Thayer
Hubler, W. G.	*Finlayson, Donald G.	*Hopkin, Albert P. E.		
No Data Supplied Douglas, Geo. M.	N. J. Zinc Expl. Co. (Canada)	Hunting Survey Corp.		
	Ltd.	*Hogg, Nelson		
LIVELY	Goranson, Edwin A.	*Paterson, Norman R.		
Int'l Nickel Co. White, Sherman A.	Scott, Alan	C. C. Huston & Assoc.		
Wager, Robert F.	Quebec Metallurgical Ind.	*Huson, Charles C.		
LONDON	Ltd.	Imperial Bank of Canada		
Univ. of West Ontario *Uffen, Robert J.	*Davis, Norman B.	Redrupp, Reginald J.		
MADSEN	No Data Supplied	Int'l Mine Services		
Madsen Red Lake Gold Mines *Crayton, Edmund G.	Frenette, Hiawalis	*Newman, William R.		
VanLoon, Leslie Hart	*Goudge, Monroe F.	Int'l Nickel Co. of (Canada)		
MANITOOWADGE	McCready, H. H.	Ltd.		
GECO Mines, Ltd. Jokisch, C. R.	*O'Neill, John J.	Parker, Ralph D.		
Lanchester, Frank	*Spence, Hugh S.	Invent. Corp., Ltd.		
Marshall, G. Merle T.		*Archibald, Charles W.		
Waterland, T. M.		W. F. James & B. S. W.		
No Data Supplied Doyle, Donald M.		Buffam,		
MARMORA		*Cooper, Marsh A.		
Marmaraton Mining Co. Ltd. Lorenzen, C. Alvin		*Buffam, B. S. W.		
Olsen, Harold O.		Francis R. Joubin & Assoc.		
No Data Supplied Mcchesney, J. S. K.		*Joubin, Francis R.		
		Kenoco Explorations,		
NEW LISKEARD		(Canada) Ltd.		
Langis Silver & Cobalt Mining Co.		Brooks, Robert R.		
*Jerome, James E.		Sullivan, C. John		
NORTH BAY		Kerr-Addison Gold Mines,		
Canadian Longyear, Ltd. *Stevenson, J. G. A.		Ltd.		
No Data Supplied Warren, R. A.		Row, William S.		
OAKVILLE		Kilburn Engrg. Ltd.		
C. P. Jenney *Jenney, C. Philip		*Crocker, Bunting S.		
No Data Supplied Keefe, John A. C.		*Dewar, K. M.		
MacLeod, John		Lundberg Explorations, Ltd.		
McLachlan, Charles G.		*Lundberg, Hans T. F.		
ONAPING		*Batchiffe, John H.		
Falconbridge Nickel Mines Ltd.		*Wilson, Basil T.		
Makarinsky, Frank M.		McIntyre-Porcupine Mines		
		Carter, John M.		
ORILLIA		Urquhart, M. L.		
Dorr-Oliver-Long, Ltd.		McIntyre Research Found.		
McVeigh, Hamilton G.		Hannon, John W. G.		
		Min Equipment Co. Ltd.		
OTTAWA		Childerhouse, T. M.		
Canadian Gov., Dept. of Mines & Tech. Survey		Edgerley, James D.		
Buck, W. Keith		Gunn, Jack Emerson		
Hayslip, Gordon O.		Moneta Porcupine Mines, Ltd.		
Ignatieff, Alexis		Burton, Fred R.		
Pickett, Daniel E.		New Cons. Canadian Explor.		
Reeves, John E.		Co.		
Smith, Harold Wm.		Breaksey, B. I. F.		
Woodroffe, Henry M.		New Hosco Mines, Ltd.		
Wyman, R. A.		Hosking, Wm. J.		
SCARBOROUGH		Newmont Min. Corp. of		
No Data Supplied		Canada		
Boyko, W. P.		Murphy, Richard F.		
Shaw, William W.		Noranda Mines, Ltd.		
SCHUMACHER		Murdoch, James Y.		
McIntyre Porcupine Mines, Ltd.		Porritt, Richard V.		
Griffis, A. Thomas		Northern Miner		
Johnson, Eric W.		Carrington, John W.		
McCrodan, Peter Byron		Pearce, Norman C.		
SILLSVILLE		Ontario Dept. of Mines		
No Data Supplied		Hurst, MacLeod E.		
		Rickaby, M. C.		
		Ontario Res. Foundation		
		Cavanagh, Raymond L.		
		Osisko Lake Mines, Ltd.		
		Maxwell, Walter B.		
		Phelps Dodge Corp. of		
		Canada, Ltd.		
		Hutchinson, William A.		
		Revjo Mgmt		
		*Lawlor, Larry F.		
		Rio Tinto Min. Co. of Canada		
		Bonifield, John B.		
		Enrich, Reinhart P.		
		*McFarland, Donald J.		
		Roach, A. Gerald		
		Rosalina Mining Ltd.		
		*Jungersen, Thorger G.		
		A. H. Ross & Assoc.		
		*Ross, Alvin H.		
		*Ward, Ernest W. S.		
		Selco Engr. Co., Ltd.		
		Parks, Thurne		
		Sherritt Gordon Mines, Ltd.		
		Galle, Alan E.		
		Simard & Knight & Assoc.		
		*Simard, Lionel R.		
		Southwest Potash Corp.		
		Barker, R. A.		
		Gamble, Terry S.		

North America-Mexico

No Data Supplied Baker, H. D. Monroe, David L.	Cons. Mining & Smelting Co. of Canada, Ltd. Yates, Edward M.	SCHEFFERVILLE	ELSA	DURANGO (DURANGO)
BLACK LAKE	Cons. Zinc Corp. of Canada, Ltd. Moss, Frank A.	Iron Ore Co. of Canada Campbell, Douglas Scott Harries, David R. King, H. Graham McCombe, John E.	United Keno Hill Mines, Ltd. *Wall, W. Arthur	No Data Supplied Maldonado, Carlos F. Neumann, G. W.
Lake Asbestos of Que., Ltd. Edwards, Thomas R. Messel, Michael J. Pluze, Lionel Charles	Cyanamid of Canada McDonald, Fred L.	No Data Supplied Dominion Engrg. Co. Nelson, John E.	WHITEHORSE	GUANACENI (DURANGO)
BOURlamaque	Dominion Steel & Coal Corp. Fairley, A. L., Jr.	Goldsmith, Robert Isherwood, R. J.	No Data Supplied Christensen, Arthur K.	Cia Minera "El Trebal" Behrens, R. Howard
Dome Exploration Co. Bambrick, Heber Lamaque Mining Co. Taylor, Kenneth L.	Dorr-Oliver-Long, Ltd. Hart, Harry F.	SEPT ISLES	MEXICO	TAYOLTITA (DURANGO)
Sigma Mines (Que.) Ltd. Hartman, Robert J.	Flygt Canada, Ltd. Gillespie, Albert G.	Iron Ore Co. of Canada Farnam, H. E., Jr. Fitzpatrick, Jeremiah J.	BAJA CALIFORNIA	San Luis Mining Co. Guzman, Carreon Luis Morel, Robert C. Richardson, Peter W. Williams, Stanley E.
CAP-DE-LA-MADELEINE	Glover Assoc. (Can.) Ltd. *Richardson, James K.	Fowler, Howard M. Kidder, Kendall	CHIHUAHUA	No Data Supplied Benham, Wilard M.
Freeman Corp. *Berkovich, Serge A.	Hewitt Equip. Ltd. Mills, Gordon Beattie	Moss, A. E.	American Smelting & Refining Co. Peyton, Francis Keith	TEPCCHANNES (DURANGO)
CHIBOUGAMAU	Iron Ore Co. of Canada Dufresne, Cyrille A.	Pitta-Foley	Snow, W. E.	No Data Supplied Welsh, M. J.
Campbell Chibougamau Mines, Ltd. Babcock, George H. Lowe, Evan A. Siscoe, Stan F. Walker, Arnold M.	McGill Univ. *Morrison, Robert G. K. Sikka, D. B.	May, Clyde R.	TEPEHUANES (DURANGO)	Cia Minera de Penoles Savage, John P.
Chibougamau Assay Office Wilkie, Raymond E.	Mine Equipment Co., Ltd. Clark, J. H.	Quebec Cartier Mining Co. Brousseau, Pierre	FEDERAL DISTRICT	Aguascalientes Metal Co. Doerr, Karl P.
Copper Rand Mines Grant, Harold G. *Gleeson, Christopher F. Portage Island Chib. Mines Dresner, N.	Shipley, George W.	Manseau, H. F., Jr.	Amer. Smeltg. & Refin. Co. Campbell, Charles W. Yaeger, A. Joseph	Amer. Smeltg. & Refin. Co. Campbell, Charles W. Yaeger, A. Joseph
CLAIRE	S. D. Miller & Sons	Van Houten, Charles N.	Atlas Del Mexico	Atlas Del Mexico
Pickens Mather & Co. Harris, Donald G.	Pickards Mather & Co. Miller, Alfred N.	Wabush Iron Co., Ltd.	Zahnlow, C. F.	Zahnlow, C. F.
DORVAL	Gerber, Harry G. Kennedy, Bruce E.	Veith, David L.	Aruxfura Panamericana S. A. Jaquet, Harold H.	Aruxfura Panamericana S. A. Jaquet, Harold H.
Atlas Copco Can., Ltd. Romanuck, Morley S.	Premier Iron Ores, Ltd. *Cavanagh, Patrick E.	No Data Supplied McManus, Clare E.	Cla Carbonifera de Sabinas	Cla Carbonifera de Sabinas
GARDENVALE	Redpath Library MacEwan, James	SHAWINIGAN	*Villafana, Manuel	*Villafana, Manuel
Canadian Mining Journal *Mamen, Christen	Rosario Explorations, Ltd. Knight, Edward T.	Canadian Carborundum Co. Hawn, A. Conrad	Cia Exploradora Del Istmo	Cia Exploradora Del Istmo
HUDSON	St. Lawrence River Mines Ltd.	SHAWVILLE	Mason, Edward O.	Mason, Edward O.
No Data Supplied Walker, W. J. K.	Riverin, Paul E.	Hilton Mines, Ltd. Halupka, Herman A.	*Seyffert, Willis A.	*Seyffert, Willis A.
KILMAR	Stratmat, Ltd. Monture, Gilbert C.	Tyler, Edwin R.	Cia Minera Kennex S. A. Aguilar, Gustavo	Cia Minera Kennex S. A. Aguilar, Gustavo
Canadian Refractories, Ltd. Bray, Wm. T.	Timmins, Ltd. Armstrong, John	SHIGAWAKE WEST	Ordonez, Georges	Ordonez, Georges
KNOB LAKE	Timmins, N.A., Ltd. Weldon, Frederic E.	No Data Supplied Almond, Lloyd B.	Pantos-Alier, Jerjes	Pantos-Alier, Jerjes
Iron Ore Co. of Canada Nelder, John E.	No Data Supplied *Bassermann, Robert R.	SOREL	Ullon, Salvador	Ullon, Salvador
LENNOXVILLE	*Burbank, Herbert A.	Que. Iron & Titanium Corp. Noy, Jack M.	Consejo de Recursos Naturales	Consejo de Recursos Naturales
No Data Supplied *Bladon, Leigh W.	*Cohen, Julius M.	THETFORD MINES	No. Renovables	No. Renovables
MC MASTERVILLE	Desrosiers, P. H.	Asbestos Corp., Ltd. Foster, William H.	*Perez, Jose L.	*Perez, Jose L.
Canadian Ind., Ltd. Matthews, Fred W.	Dymant, A. E.	Harris, C. Gordon	Cyanamid De Mexico S.A.	Cyanamid De Mexico S.A.
MONTRÉAL	Fisher, Norman R.	Jenkins, G. E.	Fitzsimmons, W. M.	Fitzsimmons, W. M.
Aluminium Co. of Canada *Turney, Arthur C.	Hopper, Charles H.	Penhale, A. L.	Marley, Frank L.	Marley, Frank L.
Aluminium Laboratories, Ltd. Hose, Heath R.	Krukar, Milan	*Ross, J. G.	Denver Equipment Co. S. A.	Denver Equipment Co. S. A.
Patience, L. Patrick	Macaulay, R. M.	Smith, John M.	McGrath, John M.	McGrath, John M.
Aluminium, Ltd. Weigel, Melvin P.	Ranklin, D. M.	Thurston, Frank E.	Du Pont S. A. & Cia	Mexicana De Explosivos
Aluminium Secretariat, Ltd. Harder, E. C.	*Rettig, Joseph A.	Canadian Industries, Ltd. *Michaud, J. Marcel	Mexicana De Explosivos	Chavez, Oscar H.
Anaconda Iron Que., Ltd. Gourd, Jean J.	Stevens, Robt. W.	Johnsons Co., Ltd.	Chavez, Oscar H.	Loretta, Frank B.
Arctic Inst. of North America *Reed, John C.	Timmins, Leo H.	Johnson, A. S.	Stringham, James R.	Schiele, William R.
Atlas Copco Canada, Ltd. Jacobsen, Halfdan Sommerfeld	*Vissac, Gus Andrew	Mossop, John W.	No Data Supplied	Empresas Unidas, S. A.
Canadian Bechtel Co., Ltd. *Nizio, Boguslaw B.	MURDOCHVILLE	VAL D'OR	Galvan, Joaquin	*Carty, John T.
Way, Gordon L.	Gaspe Copper Mines, Ltd. *Berube, Harty S.	Koulomzine & Brossard, Ltd. "Koulomzine, Theodore	Goddard, Fred W.	The Fresnillo Co.
Canada Cement Co., Ltd. Hamilton, Vic. C.	Brisenden, William G.	Manitou Barvay Mines, Ltd.	Villasenor, E. C.	Villasenor, S. Luis
Canadian Chemical Co., Ltd. *Ponesse, Thomas J.	*Coleman, Richard L.	"Livingstone, David A.	Williams, A., Jr.	Ingersoll-Rand
Canadian Copper Refineries, Ltd.	NORANDA	SASKATCHEWAN	CHIHUAHUA (SAN FRANCISCO DEL ORO)	Bolton, Henry E.
*Schloen, John H.	Elder Mines, Ltd. *Honsberger, Arthur H.	ELDORADO	CHIHUAHUA (SAN FRANCISCO DEL ORO)	Joy-Sullivan Mach. Co.
Canadian Industries, Ltd. Ed, Kenneth M.	Noranda Mines, Ltd. *Ames, H. Lyall	Eldorado Mining & Ref., Ltd. Broersma, Silbertus	San Francisco Mines of Mex. Ltd.	Eberstadt, Ramon H.
Canadian Inst. of Mining & Met. Gerow, Carlyle	*Miller, Robert J. M.	Cowdery, Peter H.	Bacon, Francis G.	Mexican Gov't.
Canadian Refractories, Ltd. Pitt, Norman P.	Quemont Mining Corp. Ltd. Dwornatzek, Joachim J.	Marshall, Kneale T.	Bluege, Vincent P.	Pefia, Salvador S.
Canadian Shield Mining Corp. Geoffroy, Paul R.	Ramsell, John D.	Pittson, Victor J.	Hanson, Henry B.	Mine Safety Appliances de Mexico S. A. de C. V.
ROUYN	No Data Supplied Ballachay, A. G.	Woodward, Jack R.	COAHUILA (MONCLOVA)	Kendrick, James P.
ROUYN	Blazewicz, K.	ESTERHAZY	Altos Hornos De Mex. S. A.	Minera El Baztan
Anaconda Co., Canada, Ltd. Schloen, John H.	*Costa, John A.	Int'l Minerals & Chem. Corp. (Canada) Ltd.	De La Fuente, J. J.	Romero, Francisco
Canadian Industries, Ltd. Ed, Kenneth M.	OKA	Pickard, Frank C.	COAHUILA (MUZQUIZ)	Stanley M. Moos
Canadian Inst. of Mining & Met. Gerow, Carlyle	Quebec Columbium, Ltd. Bond, Stephen B.	No Data Supplied Lane, Robert H.	No Data Supplied	*Moos, Stanley M.
Canadian Refractories, Ltd. Pitt, Norman P.	PORT CARTIER	REGINA	*Leonidas, Gonzales B.	Perforadora Latina
Canadian Shield Mining Corp. Geoffroy, Paul R.	Que. Cartier Mining Co. Coombes, W. K.	Imperial Oil Ltd. Glover, M. R.	NUERO ROSITA (COAH.)	*Gaines, Richard V.
ROUYN	Gross, Roland W.	Gvt. of Saskatchewan Kents, Paul	Cia Minera Nacional	Francisco Perez
ROUYN	Huff, Virgil R.	URANIUM CITY	Conley, Wm. A.	*Perez, Francisco, Jr.
Anaconda Co., Canada, Ltd. Schloen, John H.	Patterson, Lewis J.	Lorido Uranium Mine, Ltd. Lendum, F. Clyde	ROSITA (COAH.)	Petroleo Mexicanos
Canadian Industries, Ltd. Ed, Kenneth M.	Peterson, Jerome L.	Gunnar Mines, Ltd.	CIA CARBONIFERA DE SABINAS	Gonzalez-Reyna, Jenaro
Canadian Inst. of Mining & Met. Gerow, Carlyle	Severson, Lloyd J.	Stevens, Donald C.	MARTINEZ, Baltazar	Sria De Haciendas, C.P.
Canadian Refractories, Ltd. Pitt, Norman P.	QUEBEC (CITY OF)	YUKON TERRITORY	SALTILLO (COAH.)	Reyes, Pedro S.
Canadian Refractories, Ltd. Pitt, Norman P.	Laval University *Letendre, Gerard	Lorido Uranium Mine, Ltd. Lendum, F. Clyde	Cia Minera Julieta S. A.	Texas Gulf Sulphur Co.
Canadian Refractories, Ltd. Pitt, Norman P.	*Waddington, G. W.	Gunnar Mines, Ltd.	*Seiber, Walter E., Jr.	*Guiza, Reinaldo, Jr.
Canadian Refractories, Ltd. Pitt, Norman P.	No Data Supplied Dufresne, A. O.	Stevens, Donald C.	Fosfato Hooker	U.S. Bureau of Mines
Canadian Refractories, Ltd. Pitt, Norman P.	ROUYN	YUKON TERRITORY	*Aguilar, Ruperto G.	Amer. Embassy
Canadian Refractories, Ltd. Pitt, Norman P.	Anaconda Co., Canada, Ltd. Schaf, Robert E.	DAWSON	Patoradora Walters	Potter, George M.
Canadian Refractories, Ltd. Pitt, Norman P.	No Data Supplied Klama, Bysko	Yukon Cons. Gold Corp., Ltd. McFarland, Warren H. S.	*Ruiz Ocampo, Julio	University of Mexico
Canadian Refractories, Ltd. Pitt, Norman P.	ROUYN	YUKON TERRITORY	(DINAMITA) DURANGO	Fries, Carl, Jr.
Canadian Refractories, Ltd. Pitt, Norman P.	Anaconda Co., Canada, Ltd. Schaf, Robert E.	DAWSON	Cia Mexicanas de Explosivos	Vaupell y Garcia
Canadian Refractories, Ltd. Pitt, Norman P.	No Data Supplied Klama, Bysko	Yukon Cons. Gold Corp., Ltd. McFarland, Warren H. S.	Easter, Robert J.	*Garcia, Jose A.
Canadian Refractories, Ltd. Pitt, Norman P.	ROUYN	YUKON TERRITORY	McLaughlin, J. Frank	*Vaupell, C.W.
Canadian Refractories, Ltd. Pitt, Norman P.	Anaconda Co., Canada, Ltd. Schaf, Robert E.	DAWSON	Zincarmex	Nieto, Jorge C.
Canadian Refractories, Ltd. Pitt, Norman P.	No Data Supplied Klama, Bysko	YUKON TERRITORY	No Data Supplied	No Data Supplied
Canadian Refractories, Ltd. Pitt, Norman P.	ROUYN	YUKON TERRITORY	Azcon, E.	Azcon, E.
Canadian Refractories, Ltd. Pitt, Norman P.	Anaconda Co., Canada, Ltd. Schaf, Robert E.	DAWSON	Ball, Donald A.	Ball, Donald A.
Canadian Refractories, Ltd. Pitt, Norman P.	No Data Supplied Klama, Bysko	YUKON TERRITORY	Barajas, C.	Barajas, C.
Canadian Refractories, Ltd. Pitt, Norman P.	ROUYN	YUKON TERRITORY	*Bonillas, Ygnacio S.	*Bonillas, Ygnacio S.
Canadian Refractories, Ltd. Pitt, Norman P.	Anaconda Co., Canada, Ltd. Schaf, Robert E.	DAWSON	Avila, T. S.	Booth, D. M.
Canadian Refractories, Ltd. Pitt, Norman P.	No Data Supplied Klama, Bysko	YUKON TERRITORY	Briceno G., Roberto	Briceno G., Roberto
Canadian Refractories, Ltd. Pitt, Norman P.	ROUYN	YUKON TERRITORY	Cisneros, Vicente	Cisneros, Vicente
Canadian Refractories, Ltd. Pitt, Norman P.	Anaconda Co., Canada, Ltd. Schaf, Robert E.	DAWSON	Creel, Luis J.	Creel, Luis J.
Canadian Refractories, Ltd. Pitt, Norman P.	No Data Supplied Klama, Bysko	YUKON TERRITORY	Cruz-Rodriguez, A.	Cruz-Rodriguez, A.

Mexico-Brazil

Dacosta, E. A.	Slessinger, L. J.	New York & Honduras	HAITI	MENDOZA
Despina, J. E.	Wilhelmi, Fred A.	Rosario Mining Co.	MIRAGOANE	No Data Supplied
De Murga, Alvaro	No Data Supplied	Emdin, Harry J.	Reynolds Haitian Mines	Monchablan, Alberto
Fernandez, Mario	Morel, Lawrence F.	Morris, William Pierce	Ryan, E. J.	Perichon, Luis A.
Reyes, Jose Miguel Salcido		Stott, George F.		
Gallardo-Vasquez, G.				
Gandara, G. J. J.				
Hardy, J. K.				
Himmeleinstine, Carlos				
Holguin, C. C.				
Johnson, Robert W.				
Llamas, Raymundo C.				
Madero, Enrique				
Cortes-Obregon, Salvador				
McCarthy, John C.				
Miller, Robert M.				
Mosonyi, Emil				
Nevin, Thom M.				
Oliver, John G.				
Rhodes, Wm. B.				
Roel, Faustino P.				
Rose, Hugh				
Sanford, Henry J.				
Sarrels, W. H.				
Schroeder, Lawrence C.				
Shedwick, William John				
Soto, Pedro Reyes				
Tapia, T. Roberto				
Terrazas, Alfredo				
Torreses L., A. J.				
Trevino, S. F.				
Veytia, M.				
Vinegria, F. O.				
Yanez, J. R.				
Von Ziegler, E.				
GUADALAJARA				
No Data Supplied				
Adams, Malcolm M.				
Wasteneys, Geoffrey M.				
Whishaw, Quentin G.				
GUERRERO				
Amer. Smelt. & Ref. Co.				
Bond, E. Thomas, III				
Robles, Manuel A.				
No Data Supplied				
Foster, Earl F.				
HIDALGO				
No Data Supplied				
Peabody, G. R.				
JALISCO				
Cia Minera Auttan, S.A.				
Madero, Enrique, Jr.				
No Data Supplied				
Mitchell, George W.				
Calvillo T., Manuel				
Swecocomex S. A.				
Hughes, Herbert V.				
MORELOS				
No Data Supplied				
*Sopris, Robley F.				
Woodul, J. R.				
NUEVO LEON				
Cia Minera del Cerro				
Negro, S.A.				
Jauregui, Luis A.				
Cia Minera de Penoles, S. A.				
Lopez Barrera, Alfonso				
Sanchez Mejorada, Pedro				
Williams, C. T.				
Cia Minera Nuevo Leon, S.A.				
Jacob, Leonard, Jr.				
Perez, Jose Jesus				
Fundidora De Hierro				
*Villanueva, Salvador V.				
Las Encinas, S.A.				
Hannan, J. H.				
Minquines Internacionales, S.A.				
Colen, Henry R.				
No Data Supplied				
Carreto, Felipe				
Garcia, O. S.				
Haro, Mauricio C.				
*Salisbury, Earl F.				
Sauza, Javier				
Schaefer, Ronald W.				
Tripplett, W. H.				
SAN LUIS POTOSI				
Amer. Smelt. & Ref.				
Maese, Arthur J.				
Pickard, Greenleaf W.				
Salvi, Gust J.				
Compania Minera Las Cuevas				
Almazan, C.				
Metella, S.A.				
*Brown, Philip Bigelow				
Minerales Pennsalt, S.A.				
*Cutting, P. J.				
Neg. Mra. de Azufre, S.A.				
Zironi, Francis V.				
SINALOA				
Amer. Smelting & Ref. Co.				
Amis, Cecil R.				
SOCIETY OF MINING ENGINEERS OF AIME				
Slessinger, L. J.				
Wilhelmi, Fred A.				
No Data Supplied				
Morel, Lawrence F.				
SONORA				
Cananea Cons. Copper Co.				
Cooper, James R.				
Croker, Kenneth R.				
Donohoe, Carroll P.				
Fenn, Alvin J.				
Humphrey, William A.				
Mendelsohn, Albert				
Montijo H., Fernando				
Morris, George E.				
Stern, Roger				
Tye, Wm. H.				
Wells, James T.				
Weed, Robert C.				
Grafitera De Sonora, S.A., de C.V.				
Hammond, Arthur H.				
General Minerals de Mexico				
*Fields, Howard H.				
Mina de Guatamalo, S.A.				
*Lyons, H. Gratian				
Minas Quintero, S.A.				
*Lambert, Donald P.				
Minerals America, S.A.				
Williams, Ben F.				
No Data Supplied				
Taylor, Melvin H.				
Lord, William D., Jr.				
Quintanilla, F. L. G.				
Ramos, Miguel O.				
Price, R. W.				
TAMPA				
Cia Unida De Inversiones, S.A.				
Cia Mex. El Triangulo, Sde RI.				
Cochran, Reid Burchfield				
No Data Supplied				
Rodriguez, F. H.				
VERA CRUZ				
Cia de Azufre Veracruz				
Brooke, Chase J., Jr.				
Westinghouse Electric Co. of Mexico				
Fellencer, Charles A.				
No Data Supplied				
Bustos, Guillermo A.				
Smard, Robert				
ZACATECAS				
Cia Minera de Penoles, S.A.				
Engstrom, John A.				
McCabe, Robert R.				
Clinton, Peck DeWitt				
No Data Supplied				
Manderfield, Edward A.				
FRESNILLO				
The Fresnillo Co.				
Anderson, Richard C.				
Bailey, Fred W.				
Carswell, John M.				
Meyer, Robert Lee				
Schou, Hans H.				
Stone, John B.				
Veale, Charles J.				
von Ziegler, Frederick G.				
Walsh, F. H.				
SOMBRERETE				
American Smelting & Ref.				
Bobzen, Donald W.				
Minera San Martin				
Johnson, Stanley W.				
Kohls, Albert E.				
CENTRAL AMERICA				
COSTA RICA				
Alcoa de Costa Rica, Inc.				
Stouffer, Harold W.				
Legacion De Holanda				
Zijderfeld, P. H.				
No Data Supplied				
Strong, Phillip K.				
GUATEMALA				
Intl. R. R. of Central Amer.				
Crowe, E. W.				
Comp. Minera De Guatemala				
Probert, Alan				
Tufts, John M., Jr.				
No Data Supplied				
Corzelius, C. F.				
Delaitre, Pierre C.				
Morrison, Robert P.				
HONDURAS				
Tela Railroad Co.				
Lane, E. C., Jr.				
DOMINICAN REPUBLIC				
Bestwall Gypsum Internl.				
Merriss, Philip R.				
BARAHONA				
Univ. do Oriente				
*Luft, Stanley J.				
CIUDAD TRUJILLO				
Alcoa Explor. Co.				
Moreno, Francisco				
Hubert Van Blyenburgh,				
John R.				
CORDOBA				
No Data Supplied				
De Ferari, Ciro P.				
ENTRE RIOS				
No Data Supplied				
Soldini, J. R.				
MIRAGOANE				
Reynolds Haitian Mines				
Ryan, E. J.				
PORT AU PRINCE				
Soc. d Explor. et de Dev.				
Frank, Virgil E.				
NICARAGUA				
BONANZA				
Neptune Gold Min. Co.				
Aguirre, Luis H.				
Burton, Robert S.				
CHONTALES				
No Data Supplied				
Willey, J. A.				
MANAGUA				
Cia Minera La India				
Spencer, Donald N.				
La Luz Mines, Ltd.				
De Voogd, Nicolaas				
Kentish, Norman N.				
Neptune Gold Min. Co.				
McCullough, W. Stuart				
Schuring, Henry G.				
Rosita Mines Ltd.				
Galloway, Walter F.				
Hopper, Ronald V.				
Servicio Geologico Nacional				
*Lagana, Tito				
PUERTO CABEZAS				
Neptune Gold Min. Co.				
Corcoran, T. A.				
RIO COCO				
Minas Santa Rosa				
Anderson, Thorsten M.				
PANAMA CANAL ZONE				
BALBOA				
Panama Canal Co.				
*Hurtado, Julio E.				
RIO COCO				
Minas Santa Rosa				
Anderson, Thorsten M.				
PANAMA				
PANAMA CANAL ZONE				
WILLIAMSFIELD				
Aluminum Jamaica Ltd.				
Frost, Francis E.				
Lilliecrapp, D. H.				
Puerto Rico				
SAN JUAN				
No Data Supplied				
St. Clair, John O.				
WILLIAMSFIELD				
Aluminum Jamaica Ltd.				
Frost, Francis E.				
Lilliecrapp, D. H.				
Puerto Rico				
SAN JUAN				
No Data Supplied				
St. Clair, John O.				
VIRGIN ISLANDS				
FREDERIKSTED				
Basic Materials Inc.				
Russell, Thomas F.				
ST. THOMAS				
No Data Supplied				
*McKim, James				
NETHERLANDS ANTILLES				
Mijnmaatschappij Curacao				
Heywood, Tom T.				
SOUTH AMERICA				
ARGENTINA				
Banco de Fum. Agric. E. Ind.				
Francisco, Moron				
Ingersoll-Rand de Cuba				
Garriga, Jose R.				
Moa Bay Min. Co.				
Colligan, Richard V.				
Observatorio D. Colegio				
Goberna, Joseph Raphael				
No Data Supplied				
Castro, Carlos				
Ruiz-Williams, E. J.				
Vidal, F. F.				
Wandke, Alfred D.				
MATAHAMBRE				
Minas de Matahambre				
Lleras, David F.				
MOA BAY				
Moa Bay Min. Co.				
Schissler, John H., Jr.				
NICARAO				
Nickel Process Corp.				
Alberston, Floyd E.				
*Bakewell, Alan A.				
Harris, Charles V.				
Willey, Richard H.				
No Data Supplied				
Soler, Darwin				
SANTIAGO				
Moa Bay Min. Co.				
Darnell, Balfour F.				
Engle, Lester F.				
Kristjanson, Harold G.				
Wakeman, John S.				
Univ. do Oriente				
*Luft, Stanley J.				
DOMINICAN REPUBLIC				
Bestwall Gypsum Internl.				
Merriss, Philip R.				
BARAHONA				
Univ. do Oriente				
Merriss, Philip R.				
CIUDAD TRUJILLO				
Alcoa Explor. Co.				
Moreno, Francisco				
Hubert Van Blyenburgh,				
John R.				
CORDOBA				
No Data Supplied				
De Ferari, Ciro P.				
ENTRE RIOS				
No Data Supplied				
Soldini, J. R.				
MENDOZA				
No Data Supplied				
Monchablan, Alberto				
Perichon, Luis A.				
ROSARIO				
No Data Supplied				
Werner, Hans R.				
SAN JUAN				
Cia Minera Castano Viejo				
Stewart, Thomas A.				
No Data Supplied				
Bates, Ramon Ruiz				
Ledhold, Helmut				
SAN LUIS				
No Data Supplied				
Del Cerro, E. E. R.				
SAN NICOLAS				
Siderurgia Argentina				
Byrns, H. A.				
TRES CRUCES				
Cia Minera Aguilar, S.A.				
Brady, Bernard Francis				
Cropper, Wallace J.				
*Rossetti, Marco J.				
Steele, Robert P.				
Rossetti, Marco J.				
BOLIVIA				
Empress Minera Catavi				
*B. Alandia, Julio				
Victoria Mill				
Antezana, Carlos J.				
COCHABAMBA				
Balwan Gulf Oil Co.				
Coughlin, Robert E.				
Emp. Min. Santa Maria Ltd.				
Holme, Percy E.				
LA PAZ				
Corporacion Minera De Bolivia				
David, Oscar M.				
Empress Minera Colquiri				

Brazil-Peru

CORUMBA

Sobrami
Knowles, Donald P.

CURRAIS NOVOS

Mineracao Wahchang, S.A.
Fisher, Donald G.
Miskulin, Mike G.
No Data Supplied
Gardner, Geo D.
Pimentel, Victor J.

NOVA LIMA

St. John Del Rey Ming. Co.
Callaghan, Eugene
Erasmus, M. G.
Kocherberger, Donald
Pereira, Neudaray Martins
Penido, Guido D.
No Data Supplied
Walker, J. A.

RIO DE JANEIRO

American Embassy
Brown, Emerson Innis
Cia Auxiliar
Erickson, Eugene Philip
Fleming, Russell C.

Cia Meridional De Mineraçao
Russell, Charles B.

CODIM
Claus, Richard J.

ICOMI
Butler, Robert D.
Kendranda Pesquias

Minerais SA
Hartman, Louis W.

Mineco
Marshall, William R.

Wm. H. Muller SA

Nordholt, R. Van

U. S. Geol. Survey

Lewis, Richard W., Jr.

No Data Supplied

Alves de Souza, H. C.

*Campbell, Donald F.

*Pinagel, Hubert A.

Sydenstricker, D. G.

SALVADOR

Curso De Geol. Fac De Felo
Humphrey, Fred L.

Curso De Geol. Petr.

Mattoso, S. De O.

United Geophysical

Warren, Jack R.

SANTO ANTONIO DE JESUS

Cia Minas da Bahia
Kapadia, Adi. H.

SAO PAULO

Acumuladores Prest-O-Lite
Jewitt, W.

Inst. Geografico E Geol.

*Guimaraes, Jose

Epitacio P.

Metallurgica Moema, Ltda.

*Loeb, Michel J.

Mineracao Geral Do Brasil,

Ltda.

Jafet, Roberto Nami

No Data Supplied

Figueiredo, Enio D.

Hahmann, Heinz B.

Martinelli, Jose A.

De Moraes, Jose E.

Walker, W. S.

BRITISH GUIANA

GEORGETOWN

Demera Bauxite Co. Ltd.
Campbell, James G.
Reynolds Metals Co.
Clarke, William J.

KWAKWANI

Reynolds Metals Co.
Bartlett, Charles E.

CHILE

ANTOFAGASTA

Anglo-Lautaro Nitrate Corp.
Spencer, Cyril L.
Strong, Charles N.

Caja de Credito y Fomento

Minero

*Escalera, Marcelo C.

Empresa Minera De Mantos

Biancos S.A.

Dawidowicz, S.

*Meckel, Walter F.

Nuyink, Arie J.

Vince, Philip M.

CHUQUICAMATA

Chile Exploration Co.
Allen, Joseph C.
Becker, Robert C.
Biegman, K. A.
Bosse, John Warren
Brewer, W. A., III
Bruna, Horacio A.
Delaney, John F.
Forzman, Donald M.
Grenier, Arthur G.
Hamilton, Robert L.
Hedges, Brian F.
Hendersson, Harry B.
Hodges, Paul A.
Laurich, Robert
Marcus, Jerrold J.
Mayer, Franz L.
Monje, Enrique R.
Payne, Richard F.
Price, James H.
Randall, Robert L.
Sanders, David S.
Swift, Robert G.
Teisi, Josi H.
Vallez, Michael H.
Witcomb, Edward W.
Wyman, Gies S.

COPIAPO

Sali Hochschild S.A.
*Cossoro, Moll Carlos

EL SALVADOR

Andes Copper Min. Co.
Jones, Jack A.
Leonard, Charles B.
Marincs, Joseph M.
Parker, Greg V.

LA CRUZ

No Data Supplied
*Bowers, Carlos G.

LA SERENA

Bethlehem Chile Iron Mines
Co.
Krumm, Robert R.
Peterson, E. F., Jr.

POTRERILLOS

Andes Copper Min. Co.
*Astie, Harry A.
Bates, William A.
Beall, John V.
*Cole, Allan A.
Delzo, J. R.
Fines, Leonard O.
Hendrickson, Ian D.
Hobbsawn, Peter B.
Nicholson, David E.
Polish, Lloyd
Robbins, Harold E.
Trafton, Berl A.
Wendt, Walter
Wheeler, Eugene W.

QUILPUE

No Data Supplied
Crichton, Juan E.

RANCAGUA

Braden Copper Co.
Babson, Thomas J.
Bacon, Robert C.
Boso V., Guido
Eisner, Thomas M.
Gadberry, James W.
Grant, Byron E.
Jarrett, Stanley M.
Jiggins, Reginald W.
Mattson, Ralph S.
Morales, J. Quiroga
Niedermeyer, O. David, Jr.
Thornton, Frank R.
Warren, Norman F.

No Data Supplied
Aguirre, Luis E.

SAN FELIPE

No Data Supplied
Jimenez, E. Hagel

SANTIAGO

Braden Copper Co.

Haldeanen, Robert M.

Capote & Renacimiento

Aurifero

*Arancibia, Nemesis R.

Cerro de Pasco Corp.

James, Robert C.

Kyburz, Edward P.

Cia Amer. Smelg, S.A.

Brown, Wendell T.

Wise, Francis A.

Cia. de Acero del Pacifico

S.A.

*Gondonneau, Pablo

Cia Sud Amer. De Explosivos

*Sobral, Daniel M.

Fabrica Naci de Carburo y
Metalurgia
Echeverria, Vicente
Inst. Geologica
Hoffman, David J.

U.S. A.E.C.

Knowles, Paul H.

No Data Supplied

Benitez, Fernando

Goldmann, L.

Hornkohl, Herbert

Judson, W. R.

MacKenna, F. Cuevas

Nomura, Eichi

Swain, Robert L.

Van Dorp, J. F.

TALCAHUANO

Compania de Acero del
Pacifico
*Waisbluth, Gregorio Ch.

COLOMBIA

BOGOTA

Cia de Cementos Portland
Diamante
*Mewhiter, Sydney A.

Intl. Petro. Co. Ltd.

Glen, Sidney E., Jr.

Joy Intl. S.A.

Fritz, Glenn H.

Texaco Petroleum Co.

Robbins, Raymond K.

No Data Supplied

Aisenberg, Victor

Prieto, Joaquin A.

CALI

Compania Minera Choco
Pacifico S.A.
Azzeretti, Frank J.

Burke, Michael A.

Rumpf, Vincent G.

Soma, John L.

EL BAGRE

Pato Cons. Gold Dredging

Ltd.
Barraza, Benjamin

Eastman, J. H.

EL CENTRO

Forest Colombian Corp.

Douglass, Fred D.

HONDA

No Data Supplied

Crease, H. H.

MEDELLIN

Felix de Bedout e Hejos

de Bedout, Darío

No Data Supplied

Geale, George J.

Hill, George B.

Vom Staufen, Hubert

OTU

Frontino Gold Mines Ltd.

Baker, John F.

Camposano, Gustavo

Kennedy, Julian, III

*Lubinski, Boris V.

McPhee, Roland

Merwin, Roland W.

O'Donnell, Keith

PASTO

C M de N

Lombardo, Louis P.

SEGOVIA

Frontino Gold Mines Ltd.

Friderici, Alex A.

ECUADOR

Cia de Minas Buenaventura

*Elmer Jesus

Cia de Minas Huancan

Garrison, Pierre Louis

Diamantina, B.-H. S.A.

*Boza, Jorge H.

Dow Chemical Intl.

*Holme, R. Norman

Exportadora Peruana S.A.

*Ferryros, Ernesto H.

Fabinas

Martonyi, Frederic J.

Fabrimet

*Koechies, Henry J.

Grace y Cia

*Alvarez-Calderon R.,

Guillermo

Horna, Eliseo F.

Horna, Pedro G.

Kantorowicz, Wolf F.

Kent, George G.

Harison-Walker Ref. Co.

McCracken, William H.

Cia de Minas del Peru

Barrantes-Garate, E.

Hamilton, Bertram J.

*Herrmann, Juan B.

Juillard, Paul G.

No Data Supplied

Williams, A. Howell

CALLAO

Barrensa

*Trego, Harry E.

CASAPALCA

Cerro de Pasco Corp.

Chrzanowski, I.

*Galvan, Carlos C.

Kelly, H. Allen

Lizarraga, Luis H.

CERRO DE PASCO

Cerro de Pasco Corp.

Bayko, John H.

Diaz-Chavez, Javier

Foot, Kay W.

Fretz, C. Dixon

Germundson, James W.

Lees, William G.

Melrose, Thomas G.

Russell, Dalton L.

Warnock, George E.

Cia Minera Atacocha

Bautista, F.

Portaro, Fredo

Torres Belon Laca., Francisco

HUANCAYO

Minas Cercapuquio SA

Chaman V., Francisco

*Flores, P. Guillermo

LA OROYA

Cerro de Pasco Corp.

Bennis, Reg S.

Clarke, C. Dixon

*Flores, Julio E.

Harris, L.

Hollett, Allen B.

Hood, Stanley, R. R.

Lehto, Robert S.

McKay, C. E.

Milton, J. Gary

Quintana, Jorge

Robles, J. V.

Roggero, Carlos E.

Saunders, Bill G.

Scott, D.

Zevallos, Hipolito

LIMA

Cia Administradora de

Minas S.A.

Bernstein, Merlin

*Fleischman, Cyril L.

Rosenshine, Leon J.

Banco Minero Del Peru

*Dian Dulanto, Oscar

Stens, Alfredo G.

*Tasaico, Narciso O.

Vigil, Justo A.

Boya, Hector J.

Castrovirreyna Metal Mines

Co.

Lewis, Rachal H., Jr.

Russell, Clyde D.

McHarg, Norman S.

No Data Supplied

Alfaro, Carlos O.

Avery, Don

Ayz, Juan R.

Balon, A.

Belon, Enrique T.

Benavides, A.

Burgess, Ralph E.

Bilstein, Gunther J.

Chian, Augusto

Cook, Wilbur John

Damro, Arthur C., Jr.

De La Casa Bas, F.

Dominguez, S., P.

*Dym, K. A.

Eimor, Ismael Co.

Fernandini, C. E.

*Funereau, Enrique R.

Garcia, Marcial

Guillermo, G. D.

Jaime F., Cesar

Lebarthe, Hernando

Mastrovich, J. J.

Miranda V., L. A.

Muniz, Pedro E.

*Nogales, Luis A.

Obradovic, M.

</

Great Britain-Liberia

Warren Spring Lab.
Muller, Leslie D.
Robinson, A. J.
No Data Supplied
Great Britain
Birmingham, Arthur C. J.
Jenkins, Ivor
Patching, S. W. F.
Hacking, Richard A.
Brooks, S. D.
Almond, John K.
Lindsay, L.
Nimmo, James A.
Nicholson, Geoffrey
Bridgeman, Hamilton J. C.
Cooper, Peter H.
Thomas, A. M.
Daniel, Joseph A.
Allan, John C.
Appleyard, Kenelm C.
Ballint, Andrew
Boise, E. W.
Burwood, Douglas S.
Dannatt, Cecil W.
Day, Sidney D.
Desane, M. Sheila
Dzienisiewicz, J.
Farrant, James Clifford
Gill, Donald
Halle, Edwin L.
Horwood, C. Baring
Howe, Alan
Jackson, L. R.
Jones, Wm. D.
Prain, Ronald L.
Sandham, J. E.
Scott, Peter M.
Selkirk, W.
Skelmersdale, Lord
Soane, A. B.
Steidle, Edward, Jr.
Walter, A. J. Petrie
Wrobel, Stanislaw A.
Higgins, Bernard A.
Hugill, Clifford
Aldous, P. Kenyon
Reeve, Lewis
Statham, I. C. F.
Coyle, Robert G.
Semmens, John W.
Dixon, A. H.
Higgins, A. Howard
Ford, P. V. G.
Cartwright, W. F.

SCOTLAND

BONNYBRIDGE
Malcolm, Robert
Moore, Robert A.
*Masterton, William F.

GLASGOW

Rutherford, W. P.
Cruckshank, M. J.
Napier, Alex N.
Jackson, James
Thorneycroft, T. H.

WALES

S. WALES
Lancaster, Robert
Clermont
No Data Supplied
Jones, A. E.
Jones, Charles H.

GREECE

ATHENS
Kasanis, S.A.
Garantis, Nicolaos G.
Hellenic Co. of Chem.
Products & Fert. Ltd.
"Mousoulous, Lucas S.
Tsoutrelis, C. E.
Greek Inst. of Geology
Zachos, K. E.

LAURIUM

Compagnie Fran. Des Mines
Du Laurium
Calatzopoulos, John

MYCONOS

Mycobar Mining Co. S.A.
Presanis, A. J.

THESSALONIKE

Woods-Smith, Terence A.
Tsalias, Dimitrios P.
No Data Supplied
Barounis, A. N.
*Catrakis, Stavros D.
Danikas, P. O.
Eliopoulos, George

Scalistiri, D.
Siotis, George J.
Van Drunen, William
Apostolidis, N. C.

HUNGARY

EYETEMVARDS
Tech. University
*Boldizsar, Tibor

ICELAND

*Tryggvason, Tomas

ITALY

GENOVA
Carli, Adriano A.
Soc. Fin. Sider. Finsider Spa
Audibert, Paul
Ferromini
*Chinaglia, Carlo

CORNIGLIANO

Inst. Siderurgico Finsider
*Scortecci, Antonio
*Silia, Giovanni B.

MILANO

Mineraria Prealpina Spa
Jefferson, D. Kelly
Istituto Ricerche Breda
*Reggiori, Alessandro
Montecatini, S.A.
Rossi, Giovanni
Politecnico Di Torino
*Stragiotti, Lelio
No Data Supplied
Tradardi, Paolo D.
Zoppis, Renato
Salomone, Mario

ROME

Christensen, J. A.
*Thomas, Conrad W.
Usoni, Luigi

TORINO
*Debenedetti, Arturo
Liprandi, Giuseppe
Jannelli, E.

LUXEMBOURG

Schmit, Rene

MONTE CARLO

Joy International, S.A.
Bur, George H.
*Coffey, Leonard M.
Letter, Robert Paul
Wheeler, H. R.
Williams, Melvin E.
Golson, George A.

NETHERLANDS

Van Der Graaff, J. B.
*Seldenhraaf, Theodorus R.
De Haan, W.
*Van Bosse, P. M.

HUIZEN

*Van Arkel, Hubertus

ROTTERDAM

N. V. Vulcaan
Koeten, Klaas
Krijgman, Centinus
No Data Supplied
De Wijs, Henri J.
Van Bevervoorde, W.

GELEEN

Paulen, A.

THE HAGUE

Bock, P.
*Francken, Robert B.
Haughton, A. L.
Billiton Co.
Wijnans, A. M. A.
Corts, Cornelis W.

NORWAY

BJORNEVATN

A/S Sydavaranger
Brekke, Rottar
Smith, Meyer Ulf

LOKKEN VERK

Orkla Grube AB
Okkenhaug, Arne

MORANA

A/S Bleikvassli Gruber
*Jonsson, Ingebrig
*Fangel, Henning
A/S Sydvaranger
Johansen, Kraft J.
Lund, Worm

NORDLANDSBANEN

Elektrokemisk A/S
Engrelius, Johan Gustaf
Christofeersen, R.

SULITJELMA

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*Hofseth, Arne F.
Killingsdal Grubeselskap
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No Data Supplied
Bræaten, Formod
Am dah, Thor M.
*Kill, Erling
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*Flores, Francisco
De Almeida
*Cerveira, Alberto de M.
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*Berglund, Carl-Bertil E.
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NACKA

*Kjelgaard, Axel W.

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*Kihlstedt, P. G.
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*Zemp, Jacques Charles
Bloch, Ernst A.
*Parks, F. Newton

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*Logomerac, Vladimir G.

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Ferguson, Louis W.
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Fortemps, H. R.

GOMA-KIVU

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*Escande, Edilbert

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Spada, Mario

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			Burma Corp. Ltd. "Budin, Franz Joseph Gov. of Burma Mines & Expl. Dept. "Khaw, Kon-Hock Gov. of Burma Res. Inst. Wir, Soe Univ. of Rangoon Sein, U. Soon

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Yee, Tao Kao
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Ho, Chee-Kin

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Kaohsiung Cement Plant
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SUAD

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*Lu, Paul H. H.

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Mayger, Leslie N.
Townsend, J. A.
Nat'l Metallurgical Lab.
Narayanan, P. I. A.
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No Data Supplied
Sahana, O. B.
Sen, N. R.

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Rajagopalaswamy, K.
Killich Industries
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No Data Supplied
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BURDWAN

Kilburn & Co.
Jain, P. P.

CALCUTTA

Geol. Survey of India
*Hands, O. P.
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No Data Supplied
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Kim, Sung Ho
Korea Tungsten Min. Co.
*Huh, Ginn
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*Nonini, Lewis G.
Dutcher, Howard G.
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No Data Supplied

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No Data Supplied

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No Data Supplied
Haque, M. Anwar Ul

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*Svanholm, John W.
Nat'l Energy Authority
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Dredging Ltd.
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TAUKAPA

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Kulvanit, Praesert

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Lindberg, R. E.
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Ho, Au-Ngoc

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KILLARA

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No Data Supplied
McKensey, Stanley

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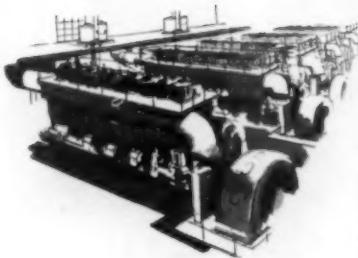
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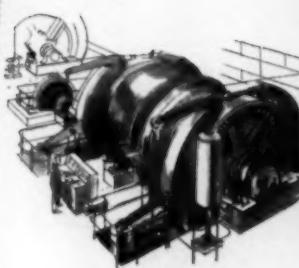
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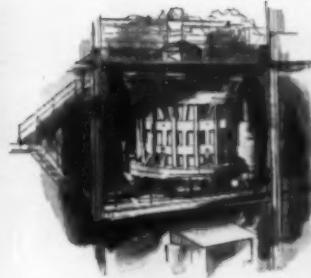
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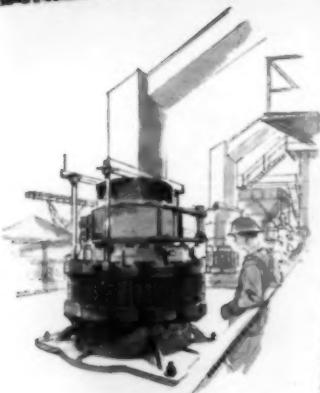
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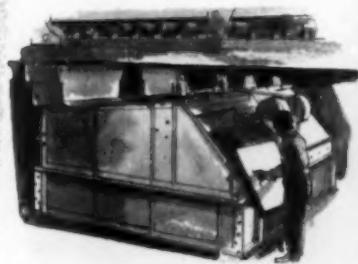
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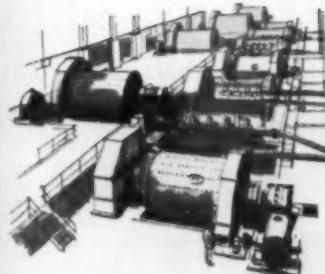
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SME BULLETIN BOARD

Reports of Your Technical Society



SME Board Meeting To Be Held in Denver October 4

Brown Palace Hotel in Denver will be meeting place for SME Board of Directors. At least part of the meeting will be open to all members. Many SME Board members will attend the Colorado Plateau Section meeting next day to hear a talk by AIME President Joseph L. Gillson. SME also recommends the following session listed in the tentative technical program of the Society of Petroleum Engineers' Fall Meeting in Denver October 2-5:

MONDAY, OCTOBER 3

2:15 p.m. to 5:00 p.m.—ROCK MECHANICS—Brown Palace Hotel

1531-G: Geologic Aspects of Fracturing Reservoirs, P. C. BADGLEY, Colorado School of Mines; W. C. PENTILLA, The Atlantic Refining Co.; and J. K. TRIMBLE, Ohio Oil Co.

1532-G: The Fragmentation of Brittle Media by Concentrated Loadings, R. SIMON, Battelle Memorial Institute

1533-G: Photoelasticity Study of Rock Bit Tooth Behavior, W. H. SOMERTON, U. of California

1534-G: Fractures and Craters Produced in Sandstone by High Velocity Projectiles, J. S. RINEHART and W. S. MAURER, Colorado School of Mines

1535-G: Velocity-Log Interpretation: The Effect of Rock Bulk Compressibility, J. GEERTSMA, Koninklijke/Shell Laboratorium

SME President A. B. Cummins reports that effective June 30, 1960, his address is:

Morning Glory Road
Bound Brook, N. J.

SME NOMINATIONS BEGIN PAGE 847

Remember These Fall Section Meetings

Joint meeting of SME Coal Division and AIME St. Louis Section, St. Louis, September 8-9.

AIME Adirondack Section meeting, September 24. Tour through Gouverneur Tale Co. plant, Gouverneur, N. Y.

AIME Colorado Plateau Section meeting, Denver, October 5.

AIME Rocky Mountain Minerals Conference, Salt Lake City, October 5-7. Utah Section host.



1961 NOMINEES FOR INSTITUTE OFFICERS AND DIRECTORS



L. E. ELKINS

Lloyd E. Elkins has been nominated for AIME President-Elect by the Society of Petroleum Engineers to take office as President in 1962. Mr. Elkins is the production research director for Pan American Petroleum Corp. He has been associated with the company since 1934 when he joined Stanolind Oil & Gas Co. (now Pan American) after graduation from Colorado School of Mines. He has served AIME as a Board member and vice president. He has also served the Society of Petroleum Engineers in many capacities.

Vice Presidents—Directors

A. B. Cummins, President of SME for 1960, is serving a three-year term on the AIME Board of Directors and has been nominated by the Society of Mining Engineers to serve as AIME vice president for one year. He is manager, Central Chemical and Physical Research Dept., Johns-Mansville Research Center, Manville, N. J. After earning his doctorate at the University of California in 1920, he joined the Celite Co. (now a part of Johns-Mansville) and became a development engineer, research engineer, manager of Celite research, manager of basic research, and finally in 1956 manager of the department he now heads.

J. W. Woomer, Past-President of SME for 1960 and a Vice President of AIME in 1960, has been nominated by the Society of Mining Engineers to serve another one-year term as Vice President. Mr. Woomer is head of his own consulting firm in Pittsburgh. He has long been an active member of the AIME Coal Division.

John S. Bell, Past-President of SPE, has been nominated by the Society of Petroleum Engineers as AIME



A. B. CUMMINS



J. W. WOOMER



J. S. BELL



W. E. GLENN



C. C. LONG



J. S. SMART, JR.

Vice President for one year. Since June 1959 Mr. Bell has been area production manager, Gulf Coast area, Humble Div., Humble Oil & Refining Co. He has been with the company since his graduation from the University of Oklahoma in 1930.

Wayne E. Glenn, 1960 President of the Society of Petroleum Engineers, has been nominated by the Society as AIME Vice President for one year. He is production manager for Continental Oil Co. with which he has been associated since 1939, just prior to his graduation from the University of Oklahoma. He has been active in the Society for many years and served as a member of the SPE Board of Directors.

Carleton C. Long, 1960 TMS President, has received The Metallurgical Society's nomination as AIME Vice President for a one-year term. Mr. Long, who has been with St. Joseph Lead Co. since 1935, is presently director of research, zinc smelting division. He has been an active member of AIME since 1937.

J. S. Smart, Jr., 1960 President-Elect of TMS, has been nominated as AIME Vice President for one year by The Metallurgical Society. Mr. Smart is general sales manager at the American Smelting & Refining Co. with which he has been associated since 1936. Prior to that he had worked for Ford Motor Co. and Detroit Lubricator.

Directors

W. B. Stephenson, president, Allen-Sherman-Hoff Pump Co., has been nominated by the Society of Mining Engineers to serve as Director for three years (see page 847 for picture and biography).

Clark L. Wilson has been nominated by the Society of Mining Engineers to serve as director for three years. Mr. Wilson was recently named chairman of The Emergency Lead-Zinc Committee with headquarters in Washington, D. C. Since 1940 he has been associated with New Park

Mining Co. and has been vice president since 1952.

Karl L. Fettner, vice president, research and development for The Youngstown Sheet & Tube Co., has been nominated by The Metallurgical Society to serve on the Board of Directors, AIME, for three years. He is a graduate of Carnegie Institute of Technology and Massachusetts Institute of Technology.

Richard C. Cole has been nominated by The Metallurgical Society to serve on the AIME Board of Directors. He is vice president in charge of manufacturing for Vitro Chemical Co. and a vice president of Vitro Minerals Corp. He has been with the company since 1954. Prior to that, Mr. Cole served 20 yrs with American Smelting & Refining Co. He is a graduate of the University of Washington.

Robert B. Gilmore, senior vice president and director of DeGolyer & MacNaughton, has been nominated by the Society of Petroleum Engineers as AIME Director for a three-year term. Mr. Gilmore's association with AIME began as a student in 1931. He is a graduate of the University of Tulsa.

The second AIME Director representing the Society of Petroleum Engineers will be the 1962 President of the Society. The SPE Nominating Committee will announce his name in the fall and he will become an AIME Director, starting a three-year term in February 1961.



C. L. WILSON



K. L. FETTNER



R. C. COLE



R. B. GILMORE

The Chairmen of the three Society Nominating Committees have announced nominations for AIME President-Elect, Vice Presidents, and Directors for 1961.

Each of the Society Bylaws provides for additional nominations. (The Bylaws of each Society in substantially final form have been published in the Journals and in revised form in the 1957 Institute Directory.) If no alternate slate is proposed, no letter ballot will be necessary and the selections of the three Nominating Committees will be declared elected in accordance with the respective Society Bylaws well in advance of their installation at the 1961 Annual Meeting in February in New York.

SME ANNOUNCES NOMINATIONS FOR THE 1961 SOCIETY OFFICERS



W. B. STEPHENSON

William B. Stephenson has been nominated President-Elect, Society of Mining Engineers, to take office as President in 1962. He is president of Allen-Sherman-Hoff Pump Co., the position he has held since 1956. He first became affiliated with the company in 1938 after having worked for Cities Service Oil Co. and Jerguson Gage & Valve Co. In 1948 he joined Ash Export Co. as manager but by 1951 he was back with Allen-Sherman-Hoff Pump Co. as vice president. He is past-chairman of the Minerals Beneficiation Division of SME and general chairman of the AIME International Symposium on Agglomeration to be held April 1961 in Philadelphia.

Edward G. Fox has been nominated for the office of Eastern Regional Vice President for a three-year term. Since 1956 he has been president of the Bituminous Coal Operators Assn., organized in 1950 to carry on labor relations with United Mine Workers of America. He began his association with the anthracite industry during his summer vacations. Upon graduation he took his first full-time job as an engineer with J. G. White Corp. Prior to taking his post with the Bituminous Coal Operators' Assn., he was president of Philadelphia & Reading Corp. Mr. Fox is a graduate of Pennsylvania State University and was awarded its Distinguished Alumnus Medal.

Dennis L. McElroy has been nominated by the Coal Division as a Director of SME for a three-year term. He is executive vice president of Consolidated Coal Co., with which he has been associated since 1943,

beginning as chief engineer at Fairmont, W. Va. He moved to the company's Pittsburgh office in 1946 as chief engineer and became successively vice president—engineering and vice president—operations. In 1959 he became a director of the company and was appointed to his present post in May of this year. A graduate of West Virginia University, School of Mines, he served as a member of the faculty for a number of years. During World War II he served as chief of the coal section of the War Production Board. He was associate editor of Mineral Industry Yearbook, 1939-1940 and is the author of several technical works.

Raymond H. Feierabend is the Industrial Minerals Division nominee for the SME Board of Directors. He is assistant vice president of Freeport Sulphur Co., a post he has held since 1957. It was in this capacity that he was directly responsible for construction and development of Freeport's Grand Isle mine. For several years prior to this he was general superintendent of the company's Grande Ecaille operation. He joined Freeport as a junior engineer at Hoskins Mound, Texas, in 1942 following his graduation from Columbia University School of Mines. Over the years Mr. Feierabend has been active in M & E and IndMD affairs and was Secretary-Treasurer for IndMD in 1959.

Wayne L. Dowd is the Minerals Beneficiation Division nominee for the SME Board of Directors. In 1958 he was appointed regional manager for the Birmingham and Pittsburgh districts of The Eimco Corp., the position he now holds. His association with the company began in 1945 as sales engineer. In 1950 he was appointed manager of the Southern District. Prior to joining Eimco he worked for Republic Steel, beginning in 1938 as mechanical leader and working up to superintendent of the company's iron ore concentrating mill in Spaulding, Ala. He became a member of AIME in 1945 and has served on various MBD technical committees as well as being Secretary-Treasurer, Regional Vice Chairman, and Associate Chairman of the Division.

Alfred D. Rood, assistant to the vice president of Andes Copper Mining

Co. and Chile Exploration Co., subsidiaries of The Anaconda Co., has been nominated for the SME Board by the Mining and Exploration Division. A graduate of Michigan College of Mining and Technology, with B.S. and E.M. degrees, Mr. Rood began as a rodman with Inspiration Cons. Copper Co. in 1925, working up to the position of construction engineer, division engineer, and finally assistant chief engineer. From 1948 through 1955 he was in Butte, where he designed and developed the Kellie mine and other projects. In 1956 he went to Chile to draw up plans for Andes Copper Mining Co.'s El Salvador mine. Since his return to New York he has continued to be in direct contact with that project.

Frederick S. Turneaure has also been nominated by the Mining and Exploration Division to be an SME Director. A professor of geology at the University of Michigan, he previously taught at Michigan College of Mines and Technology as an instructor of geology and at Harvard University as a research associate and a visiting lecturer. He received his B.S. from the University of Wisconsin and his M.A. and Ph.D. from Harvard University. His field experience includes work with Cinco Minas Co. in Mexico, where he was an engineer in 1923-24 and chief geologist 1927-30, 1933-35; Patino Mines & Enterprises Con. Inc., where he was head of the exploration department, 1935-37, and Mauricio Hochschild, SAMI, in Bolivia; and Oliver Iron Mining Co. in Duluth. He was chairman of the Subcommittee on Fundamental Research, National Science Foundation, 1953-55.

Section 11 of Article IX, SME Bylaws, provides: "The names and biographies of the nominees shall be published in the July issue of MINING ENGINEERING. Any \$5 members of the Society may submit additional nominations to the Board of Directors for one or more of the positions specified . . . [President-Elect and one Regional Vice President.] Such nominations shall be submitted not later than September of that year [1960], and notice of the additional nominees for the position or positions designated shall then be published in the October issue of MINING ENGINEERING. . . If additional nominations are received, a letter ballot for the positions shall be sent on or about November 1 to all voting members of the Society in the United States, Canada, and Mexico. Ballots shall be returned within 45 days after they are mailed."



E. G. FOX



D. L. McELROY



R. H. FEIERABEND



W. L. DOWDY



A. D. ROOD



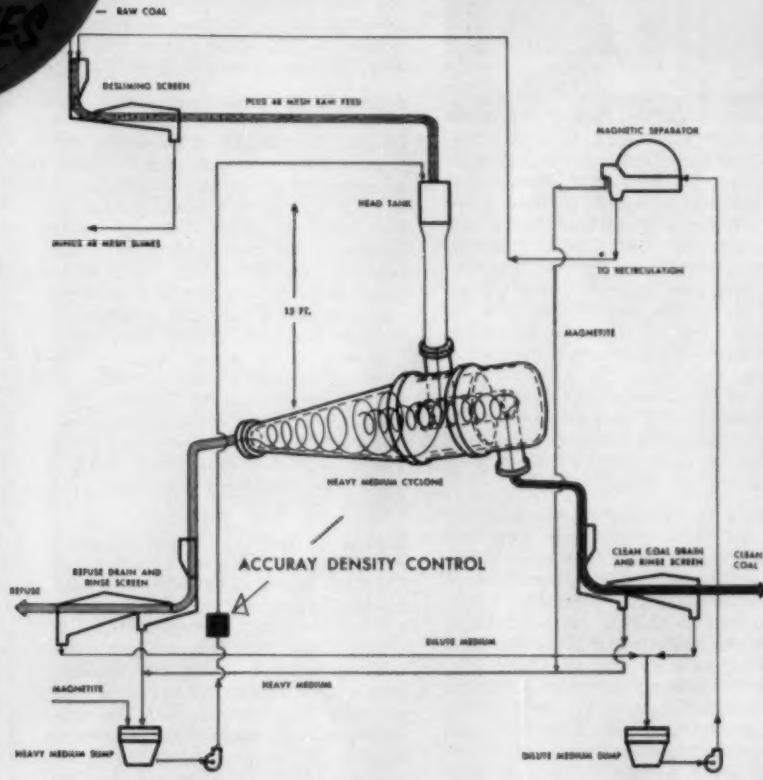
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COAL DIVISION NEWS



D. R. MITCHELL



G. E. KELLER

Nominee for Chairman-Elect of the Coal Division is **David R. Mitchell**, recently appointed associate dean of the College of Mineral Industries, Pennsylvania State University. A graduate of the university, he returned in 1938 as a member of the faculty and since 1944 has been chairman of the Division of Mineral Engineering. From 1924 to 1926 he served as an engineer with the Bethlehem Mines Corp. and from 1927 until his return to Penn State he was on the faculty of the University of Illinois. Since taking a post at Penn State, he has been able to carry on a limited consulting practice, numbering many of the coal companies in the area among his clients. As long-time secretary of the Coal Division, he is well known to the members.

George E. Keller has been nominated Secretary-Treasurer. A native of Illinois, he graduated from the University of Illinois with a degree in chemical engineering. For more than 30 years he was with Commercial Testing & Engineering Co. as manager of the Charleston, W. Va. branch and as chemical director. In 1954 he joined U.S. Steel Corp. as manager—coal evaluation, central operations coal division, the position he still holds. He was former chairman of the Central Appalachian Section of AIME and has served as program chairman and member of the Executive Committee of the Coal Division.

H. J. Hager has been nominated to serve on the Executive Committee of the Coal Division for a three-year term from February 1961 to February 1964. He is vice president—mining with Alabama By-Products Corp., Birmingham. He has been associated with the company for more than 25 years, beginning as a mining engineer principally on coal preparation and mine plant construction. He received his professional education at the University of Alabama, where he

attained his B.S. in mining engineering in 1928 and his M.S. in 1931. He secured his M.S. while on a USBM fellowship in coal preparation.

Another nominee for the Executive Committee is **James D. Reilly**, vice president of Hanna Coal Div., Consolidation Coal Co. He was born in Edinburgh, Scotland, and was brought to the U.S. while still an infant. He received his education in the public schools of West Terre Haute, Ind. In the early 1920's he first started working at various coal mining jobs. He became superintendent of Piney Fork Mine of Hanna Coal Co. in 1942; general superintendent in 1945; general manager of underground mines in 1946, and attained his present position in 1947.

Wilbur A. Weimer has also been nominated to serve as a member of the Executive Committee for the three-year term from February 1961 to February 1964. He was born in a small mining town in Illinois; reared on a farm in Kansas; and attended Kansas State College, where he took a course in mechanical engineering. Ill health forced him to withdraw in his junior year. In 1936 he was employed by the Northern Illinois Coal Corp., becoming chief engineer of the

company in 1943. When the company was merged with Peabody in 1949 he remained and has been chief engineer in charge of mines in Indiana and Illinois since then. He has been responsible for a number of inventions and developments extensively used in the coal industry.

William C. McCulloch, now serving as Chairman-Elect of the Division, will become Chairman in 1961. A graduate of the University of North Dakota, he received an M.S. at the University of Washington, where he held a USBM fellowship at the Northwest Experiment Station in Seattle. His first job was with Pacific Coast Coal Co. as coal washing engineer. In 1924 he went to work for the USBM as a coal mining engineer. The following year he joined Heyl & Patterson Inc. in Pittsburgh and in 1930 became chief chemist for Kopers Rheolaveur Co. He took the position of preparation manager in 1935 for United Electric Coal Co. and from 1941 served Roberts & Schaefer Co. in the same capacity. In March of this year he was made president of the company's Chicago operation, which engages in engineering and construction of coal preparation facilities and related fields.



H. J. HAGER



J. D. REILLY

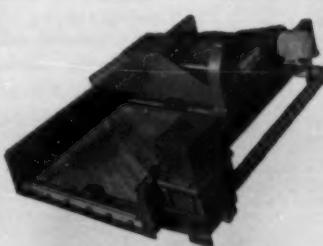


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NOTICE—SME PREPRINT AVAILABILITY, 1960 ANNUAL MEETING

The following list of papers (from the 1960 New York Annual Meeting) will be available until Jan. 1, 1961. Coupons received with the 1960 dues bills and those distributed at the 1960 Annual Meeting will also expire on this date. Purchased coupons books will be honored on any future date. A new listing of available papers will appear in a forthcoming issue. It will include additional papers presented at the 1960 Annual Meeting (New York) and at other SME meetings throughout the year. Preprints may be obtained (upon presentation of properly filled out coupon) from SME Headquarters, 29 W. 39th St., New York 18, N. Y. Coupon books may be obtained from SME for \$5 a book (10 coupons) for members or \$10 a book for nonmembers. Each coupon entitles the purchaser to one preprint.

Coal (F)

- Cox, G. D., and Keller, G. E.: Tube Furnace Method for Rapid Determination of Sulfur in Coal. **60F40**
 Corriveau, M. P., and Coll, H. F.: Solving the Flocculation Problem. **60F50**
 Davis, D. H.: Mechanized Tamping of Mine Haulage Roads. **60F70**
 Ellison, L. D.: Efficient Pillar Extraction by Means of Exhaust Ventilation. **60F73**
 Kamper, O. W.: The Exploration and Mining of Rare Materials—Production of Refractory Products—Application for the Utilization of Coal. **60F74**
 Lucas, J. R.: A Field Study in Acid Mine Drainage. **60F75**
 Mann, J.: Daily Maintenance and Complete Overhaul of Continuous Miners. **60F76**
 Morris, F. M.: Moss Number 3 Mine: The Materials Handling Aspect. **60F44**
 Ondrejka, J.: The Communications Challenge of Automation. **60F104**
 Foundations, W. N.: Face Ventilation in Development with Continuous Miners. **60F23**
 Rao, P. D., Charnbury, H. B., and Mitchell, D. R.: Crushing of Anthracite for the Reduction of Domestic to Steam Sizes. **60F14**
 Ridenour, D. C.: Ventilation of Very Gassy Mines Making Use of Large Diameter Bore Holes. **60F31**
 Sergeant, L.: Ventilation of Conventional Development in Gassy Coal Mines. **60F57**
 Spindler, G. R., and Poundstone, W. N.: Experimental Work in the Degassing of the Pittsburgh Coal Seam by Horizontal and Vertical Drilling. **60F106**
 Stachura, J. A.: Selecting the Proper Type of Continuous Miner. **60F49**
 Updegraff, L. A.: Continuous and Automatic Measurement of Moisture in Coal by Capacitance. **60F51**

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- Barr, V. L.: A New Performance Measure to Test the Contribution of the Petroleum and Natural Gas Industry in an Expanding Economy. **60K53**
 Belton, A. E.: Foreman's Incentive Plan. **60K59**
 Elver, R. B.: St. Lawrence Seaway and the Canadian Mineral Industry with Particular Reference to Iron Ore. **60K78**
 Farrier, H. M.: Trends in Property Acquisitions and Mergers in the Oil Industry Since 1954. **60K76**
 Jaworek, W. G., and Shanz, J. J., Jr.: Bituminous Coal Consumption—Estimating Its Long Term Growth and Annual Variations. **60K32**
 Mathewson, M. H.: Production Management Incentive Compensation Systems at I.M.C. **60K46**
 McGinn, P. W.: A Method of Projecting U.S. Petroleum Supply. **60K64**
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 Morgan, J. D., Jr.: U. S. Strategic Materials Stockpiles and National Strategy. **60K50**
 O'Leary, V. D.: The Butte Contract System. **60K58**
 Peterson, W. H.: The Question of Government Oil Import Restrictions. **60K60**
 Ridge, J. D.: World Trade in Metal Raw Materials. **60K107**
 Waterland, J. K.: Incentive Pay System at the Homestake Mining Company. **60K23**

Geology (I)

- Gauvin, C. J.: Geological Procedure and Control at Steep Rock Iron Mines, Ltd. **60I45**
 Macdonald, R. D.: Iron Deposits of the Wabash Lake Area, Newfoundland, Labrador. **60I67**
 Riddell, John E.: A Review of Geochemical Prospecting Practice in Glaciated Precambrian Terrains. **60I116**
 Sales, R. H.: Critical Remarks on the Genesis of Ore as Applied to Future Mineral Exploration. **60I70**
 Schmitt, H. A.: The Application of Geology to Mining in the Southwest. **60I93**
 Stringham, B.: Differences Between Barren and Productive Intrusive Porphyry. **60I97**
 Swenson, W. I.: Geology of the Nakina Iron Property, Ontario. **60I43**
 Tupper, W. M., Jensen, M. L., and Hurley, P. M.: The Genesis of the Sulfide Deposits of Northern New Brunswick—An Interpretation Based on Sulfur Isotopic Studies. **60I68**

Geophysics (L)

- Denen, W. H., and Linder, H.: Relationship of Graphite in Soils to Graphite Zone. **60L8**
 Gross, G.W.: Location of Clay Deposits by

Combined Self-Potential and Resistivity Surveys. **60L2**

- Hawkes, H. E.: Status of Geochemical Prospecting in the USSR. **60L15**
 Kellogg, W. C.: A Report on Airborne AFMAG, the Theory, Equipment, and Operation in Western United States. **60L112**
 Swanson, H. E.: Model Studies of an Apparatus for Electromagnetic Prospecting. **60L83**

Industrial Minerals (H)

- Ball, D.: Underground Gas Storage Effects on Underground Waters. **60H13**

- Bays, C. A., Peters, W. C., and Pullen, M. W.: Solution Extraction of Salt Using Wells Connected by Hydraulic Fracture. **60H100**

- Boos, M. F.: Pegmatites and Their Mineralization in the Storm Mountain Area, Larimer County, Colorado. **60H29**

- Brown, O. E.: Use of the Coulter Counter for Particle Size Analysis of Cement and Related Material. **60H71**

- Calderberry, D.: Fragmentation Studies in a Georgia Granite. **60H25**

- Cazort, J. G., Jr.: Development of a Bauxite Deposit Using Dredging as the Stripping Method. **60H16**

- Comstock, H. B.: Trends in Production and Use of Magnesium Compounds in the U. S. **60H58**

- Dobbs, E. H.: Missouri-Oklahoma Type Tripartite. **60H41**

- Gilliam, W. S.: The Cost of Converted Water. **60H14**

- Hershey, R. E.: Phosphate Raw Materials of Tennessee. **60H17**

- Hoyt, F. D., and Hartman, H. L.: Developments and Research in the Sawing of Dimension Stone. **60H45**

- Irving, D. R.: Some Beneficiation Techniques Applicable to Mineral Fillers. **60H46**

- Jenkinson, D. W.: Progress Report on Beneficiation of Aggregates by Heavy Media Separation. **60H42**

- Kadey, F. L., Hutta, F. B., Jr., and Weymouth, L. E.: A Study of the Abrasive Action of Fine Powders. **60H56**

- Kazmann, R. G.: Water: Industrial Mineral—and Industrial Nuisance. **60H3**

- Kingman, O.: Grade Control at Tennessee Copper Company. **60H2**

- Krueger, A. R.: Quarried Stone Meets the Challenge of Contemporary Architecture. **60H55**

- Lawrence, W. G.: Inorganic Materials Research in the USSR. **60H18**

- Michaelson, S. D., Ensign, P. H., Hubbard, S. J., and Last, A. W.: Water: A Raw Material for the Production of Copper. **60H59**

- Moyd, L. and P.: The Gamma-Ray Neutron Beryllium Detector as a Reconnaissance Tool. **60H95**

- Piper, J. D.: Concrete Technology in the USSR. **60H27**

- Ploetz, G. L., and Muccigrosso, A. T.: Applications for Lanthanum Oxides and Other Compounds in the Ceramic Industry. **60H7**

- Robinson, G. C.: Lightweight Clay Block Using Vermiculture. **60H47**

- Thomson, R. D.: Nonmetallic Mineral Fillers in Plastics. **60H105**

- Whitman, J. H.: Evaluation and Marketing of Rare Earth Deposits, Ores, and Concentrates. **60H42**

- Weisz, W. H.: The Role of Gypsum in Portland Cement. **60H111**

- Wykes, C. E.: Development of Extreme Settings on Deep Well Turbine Pumps. **60H1**

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- Hunter, P. L.: Industrial Accident Prevention and Health. **60A031**

- Livingston, C. W.: The Application of Explosions Research to Blasting in Mines and Quarries. **60A026**

- Nalle, P. B., and Weeks, L. W.: The Use of Digital Computers in the Mining Industry. **60A06**

- Stefanko, R.: Underground Stress Instrumentation. **60A051**

- Trollope, D. H.: The Mechanics of Rock Slope. **60A037**

- Grosvenor, Niles E.: A Method for Determining The True Tensile Strength of Rocks. **60A015**

Minerals Beneficiation (B)

- Agar, G., and Charles, R. J.: The Size Distribution Shift in Grinding. **60B5**

- Arbiter, N., and Bhansali, U. N.: Correlation of Product Size, Capacity, and Power in Tumbling Mills. **60B99**

- Aubrey, W. M.: Automatic Thickener Control at Marmaton Mining Company. **60B35**

- Barnes, J. W.: Process Control in Uranium Mills—How Far Can Automation Go? **60B96**

- Bergstrom, B. H., Sollenberger, C. L., and Mitchel, W., Jr.: Energy Aspects of Single Particle Crushing. **60B102**

- Bitisianis, G.: Problems in Magnetic Roasting of Marginal Iron Ores. **60B54**

- Bleimister, W. C., and Briston, R. J.: Beneficiation of Rock Salt at the Detroit Mine of International Salt Co. **60B8**

- Bouchard, M. A., Dettinger, J., and Robert, D.: Magnetic Recovery of Germanium Sulfide with the Franz Ferrojet. **60B38**

- Brison, R. G., and Tangel, O. F.: Development of a New Dry Method for Mineral Separation. **60B7**

- Brown, J. H., Mitchell, S. R., and Weissman, M.: Energy-Size Reduction Relationship for the Grinding of Quartz. **60B28**

- Cazort, J. G., Jr., and de Witte, J. J.: Intra-Plant Transportation and Handling of Bauxite at Suralco's Paranam, Suriname, South America Works. **60B11**

- Dahlstrom, D. A.: Basic Concepts and Automatic Control of Continuous Filtration. **60B110**

- Dalley, W. H., Jr., and Bunge, F. H.: The Reaction of Low Grade Nonmagnetic Iron Ores to Magnetic Roasting in a Fixed Bed. **60B35**

- Edwards, J. R. J., and Salamy, S. G.: The Magnetic Reduction of Jaspilite in a Shaft Furnace. **60B4**

- Emmett, R. C., and Dahlstrom, D. A.: Application of Continuous Filtration to Precipitate Dewatering. **60B114**

- Fuerstenau, S. W.: Retention Time in Continuous Vibrating Ball Milling. **60B10**

- Gilvarry, J. J., and Bergstrom, B. H.: Fracture and Commination of Brittle Solids. **60B18**

- Grothe, J. D.: Laboratory Experiments and Their Relation to Plant Design. **60B69**

- Gump, J. R.: Commercial Separation of the Heavy Rare Earths by Ion Exchange. **60B56**

- Laurila, E. A., Saari, L., and Castren, O.: An X-Ray Fluorescence Spectrometer for the Line Analyses of Titanium in Ilmenite. **60B18**

- Lewis, C. J., and House, J. E.: The Recovery of Molybdenum by Liquid-Liquid Extraction from Uranium Mill Circuits. **60B72**

- Massey, E. M.: Influence and Application of Rope Sideframe Belt Conveyors to Surface Coal Handling Facilities and Preparation Plant Design. **60B43**

- McLean, D. C., and Padilla, V.: A Study of Oxidation and Cyanide As An Oxidation Catalyst in Pressure Leaching of Uranium. **60B94**

- Merkin, K. E., and Childs, M. H.: Some Factors Influencing the Physical Qualities of Iron Ore Pellets. **60B75**

- Mitchell, G. R., Berman, H. L., and Goldberg, A. E.: The Infrared Radiometric Method and Its Application to Remote Temperature Measurement. **60B18**

- Rampack, C., and McKinney, W. A.: The Copper Segregation Process. **60B61**

- Russell, R. J.: Considerations in Selecting Grinding Equipment. **60B55**

- Sausa, L. E., and Martinson, J. E.: Pulp Density Measurement and Control. **60B34**

- Schuhman, R., Jr.: Energy Input and Size Distribution in Commination. **60B11**

- Smith, et al. (Compilation of Abstracts): Symposium on Surface Phenomenon in Mineral, Ceramic, and Metallurgical Systems. **60B12**

- Tikov, N. P., and Yegokhin, A. N.: Development of Technology for the Beneficiation of Hematite Ores. **60B100**

- Wade, H. H., and Schulz, N. F.: Magnetic Roasting of Iron Ores in a Traveling Grate Roaster. **60B36**

- Young, R. K.: Setting Up a Project Organization for Efficient Mill or Plant Design. **60B181**

Underground Mining (AU)

- Buchanan, J. F., and Buchella, F. H.: History and Development of the San Manuel Mine. **60AU9**

- Hayes, L. G.: Tri-State Zinc Inc. Bowers-Campbell Mine, Timberville, Virginia. **60AU7**

- Kostuk, J., and deBastiani, M. J.: Mine Operations at Consolidated Denison Mines Limited, Elliot Lake, Ont. **60AU89**

- Newell, T. W., and Appelin, C. W.: Small Mine Operations—Shattuck Dunn's Bardon Mine. **60AU78**

- Robbins, H. E., Dunston, W. H., and Dudley, T. H.: Andes Copper Mining Company Development of El Salvador Mine. **60AU70**

- Weeshuisen, J. M.: The Sinking of Two Shafts for the Neu Beatrix Mine by the Drilling Method. **60AU91**

MINERALS BENEFICIATION DIVISION



N. PLUMMER



S. E. ERICKSON

The Minerals Beneficiation Division Nominating Committee has selected the following people as candidates for Division offices for the term beginning February 1961. **Nell Plummer** has been nominated Chairman and **Stephen Erickson** Associate Chairman. Under MBD Bylaws, Mr. Erickson, as Associate Chairman, will head the Division's Program Committee and will serve as a member of the SME Program Committee. Mr. Plummer and Mr. Erickson have also been designated alternates for the SME Nominating Committee. **Donald A. Dahlstrom** has been named First Regional Vice Chairman and **Bunting S. Crocker**, designated Second Regional Vice Chairman, will also serve as MBD representative on the SME General Editorial Committee. Nominee for Secretary-Treasurer is **William T. Marston**.

Nell Plummer, serving as Associate Chairman during 1960, is superintendent of the Arthur plant, Kennecott Copper Corp., Magna, Utah. Before joining Kennecott he was associated with New Jersey Zinc Co., International Smelting & Refining Co., and Utah Copper Co. He received his professional education at Missouri School of Mines.

Stephen Erickson, the Associate Chairman nominee, has been serving the Division as First Regional Vice Chairman this year. He is a beneficiation engineer with M. A. Hanna Co., Hibbing, Minn. A native of Minnesota, he attended the University of Minnesota School of Mines, where he received a degree in metallurgy.

Donald A. Dahlstrom, slated to serve as First Regional Vice Chair-

man, is director of the Eimco Corp. research and development department, a position he has held since 1953. A graduate of the University of Minnesota, he received his Ph.D. from Northwestern University, where he was a member of the faculty for ten years.

Bunting S. Crocker, named for the office of Second Regional Vice Chairman, is vice president of Kilborn Engineering Ltd. Prior to his association with Kilborn he worked for Lake Shore Mines Ltd. A native of Toronto, he is a graduate of the University of Toronto.

Secretary-Treasurer designate, **William T. Marston**, is currently serving the Division in that capacity. He is area manager of industrial sales, Dorr-Oliver Inc., a position he has held since 1957. He has been with the company since his graduation from the University of Toronto in 1949.

The Nominating Committee has also named committee chairmen to serve for the coming year, if elected. **Norman Weiss**, milling engineer for American Smelting & Refining Co., has been chosen to head the Nominating Committee. He is a graduate of Massachusetts Institute of Technology and has long been active in MBD, SME, and AIME affairs. **Roy A. Johnson**, nominated Membership Chairman for a two-year period, will also serve as MBD's representative on the SME Membership Committee. He is presently manager of the Central Industrial Div. of Dorr-Oliver Inc., with which he has been associated for many years. He is a graduate of the University of Idaho.

Donald O. Carlson, mill superintendent, Kermac Nuclear Fuels Corp., has been selected as Chairman for Materials Handling and Storage. **J. H. Brown**, U.S. Steel Corp., has been chosen to head the Crushing and Grinding Committee. Solid Fluid Separation will be headed by **Dale C. Matthews**, chief metallurgist, The Anaconda Co. **George A. Komadina**, mill superintendent for Pima Mining Co., has been chosen to head

mBd'ers digest

Concentration. **F. M. Lewis**, superintendent of ore concentration at Tennessee Copper Co., has been slated to take charge of Operating Control. Chemical Process Chairman will be **F. M. Stephens**, who was with American Smelting & Refining Co. before his retirement. **William F. Stowasser, Jr.**, senior research engineer for Jones & Laughlin Steel Corp., will take care of Pyrolysis and Agglomeration. **Frank J. Windolph**, assistant general superintendent, Climax Molybdenum Co., will head Mill Design for a two-year period. **Richard J. Charles**, research associate in the metallurgy and ceramics department of General Electric Research Laboratory, has been nominated Chairman of Basic Science. **D. W. McGlashan**, a member of the faculty of Montana School of Mines, has been nominated Chairman of MBD's Education Committee and will automatically become a member of the SME Education Committee. **O. F. Tangel**, chief of Minerals Beneficiation Div., Battelle Memorial Institute, has been selected to head the Papers and Publications Committee for two years and automatically becomes a member of SME Transactions Editorial Committee, also for a two-year period. He will serve on the AIME Rossiter W. Raymond Award Committee as well.

Further nominations include representatives for SME positions. **Wayne Dowdley**, regional manager, The Eimco Corp., has been nominated director (see page 000 for photograph and biography). He has also been named to the Nominating Committee as principal member along with **H. Rush Spedden**, director of research for Union Carbide Ore Co., and this year's Divisional Chairman. **F. W. Bloecher, Jr.**, sales engineer for American Cyanamid Co., and **R. J. Middlekauff**, vice president of The Middlekauff Corp., have been chosen as Admissions Committee members. **B. Clemmons**, research director, Metallurgy Research Center, the U. S. Bureau of Mines, Salt Lake City, has been nominated to the Mineral Economics Committee.



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Mining & Exploration Division



J. G. HALL



J. M. EHRHORN



R. H. MCCONNEL



R. W. MARSDEN



H. J. LEACH

In accordance with the bylaws of the Mining and Exploration Division, the Nominating Committee presents the following slate of officers to serve during the year beginning February 1961: **J. G. Hall**, Chairman; **J. M. Ehrhorn**, Assistant Chairman; **Roger McConnel**, Vice Chairman in charge of programs; **R. W. Marsden**, Vice Chairman for publications; and **Hugh J. Leach**, Vice Chairman in charge of membership. **Frederick Turneaure** and **Alfred D. Rood** have been nominated to serve three-year terms as SME Board members (see page 000 for their photographs and biographies).

John G. Hall, nominee for chairman of the Division, is familiar to Division members, since he is presently serving as Assistant Chairman. Prior to that he had been active in AIME affairs at local section and national level for many years. Mr. Hall is plant manager of National Lead Co. Titanium Div. open pit mining, milling, and sinter operations at Tahawus, N.Y. a position he has filled since 1955. He first joined the company in 1952 as assistant plant manager of operations at Tahawus. A graduate of the University of Utah School of Mining and Engineering, he began his professional career in Utah with U.S. Smelting Refining & Mining Co. in 1939. From 1946 to 1952 he was general superintendent of Chief Consolidated Mining Co. operations in Eureka, Utah.

Jack M. Ehrhorn has been nominated as Assistant Chairman. He is director of industrial development for U.S. Smelting Refining & Mining Co., with which he has been associated since 1944. A graduate of Stanford University, from which he received his degree in mining engineering in 1927, Mr. Ehrhorn gained his early mining experience working as a miner, timberman, and shift boss with United Verde Copper Co.

in Arizona, the North Fork Placer Mines at Helena, Calif., and the Idaho Maryland Mines Corp. in Grass Valley, Calif. In 1938 he went into partnership with H. F. Lynn as a consultant engineer and geologist. For two years prior to joining U.S. Smelting Refining & Mining, he worked for Western Knapp Engineering Co.

Roger McConnel, nominee for Vice Chairman in charge of programs, has been chief geologist for The Bunker Hill Co. at its operations office in Kellogg, Idaho, since 1946. He first became associated with the company in 1938 as geologist, the position he held until 1942 when he entered the U.S. Army, where he served until 1946. Mr. McConnel is a graduate of the University of Idaho where he received his B.S. in geology in 1932 and his M.S. in economic geology in 1936. From 1936 to 1938 he was a field assistant with the USGS, working in the Coeur D'Alene district in Idaho.

Nominated for Vice Chairman in charge of publications is **Ralph W. Marsden**, manager—geological investigation for Oliver Iron Mining Div., U.S. Steel Corp. A native of Wisconsin, he attended the University of Wisconsin, where he earned his master's and doctor's degrees as well as his B.S. He worked as geologist with the Wisconsin Geological Survey during the summers of 1934 to 1936 and 1938 and 1939. When World War II broke out he was geologist and chief, Geological Survey Group, Philippine Bureau of Mines, and was interned at Cebu, Santa Tomas, and Los Banos from 1942 to 1945. In 1945 he joined Jones & Laughlin Steel Corp. as geologist and except for a one-year period, 1946 to 1947, when he was associate professor of geology at the University of Oklahoma, he worked for this company until 1951. Since 1945

he has concentrated on the study of iron ore geology, working in Liberia, Venezuela, Cuba, Canada, and the U.S.

Hugh J. Leach has been nominated to serve as Vice Chairman for membership. A native of Minnesota and graduate of the Minnesota School of Mines, he has lived and worked in the Great Lakes region all his life. He was recently named vice president for foreign operations and iron ore development for The Cleveland Cliffs Iron Co., with which he has been associated since 1945. He began his professional career with Oliver Iron Mining Div., U.S. Steel Corp. in 1939 as mining engineer. From 1941 to 1945 he was superintendent of mines for Evergreen Mines Co.

AIME Annual Meeting 1961

AIME is joining with the Society of Economic Geologists in planning the Geology Session for the 1961 Annual Meeting in St. Louis, according to a recent announcement from H. E. Harper, program chairman of the Geology Unit. Five prominent mining geologists have been invited to present papers on the subject *Mining Geology: Methods, Techniques, and Results*. The selection of papers will cover the application of geology in several of the major types of deposits and operations and should be of interest to people in mining as well as geology. SEG program chairman is M. L. Jensen, a professor at Yale University.

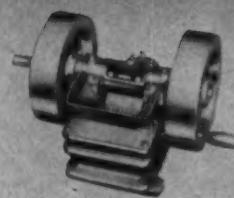
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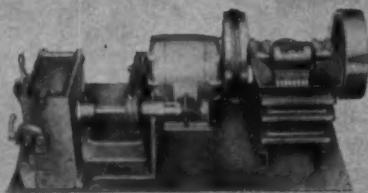
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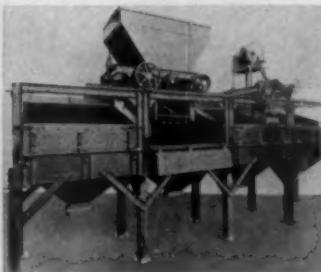
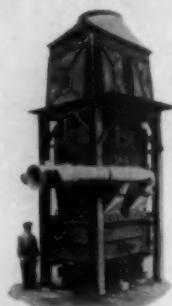
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The Nominating Committee of the Industrial Minerals Division has prepared a slate of nominees to take office, if elected, in February 1961. **Carl F. Clausen** has been nominated Chairman and **Leon W. Dupuy** has been designated Secretary-Treasurer. **R. H. Feierabend** has been named SME Director for a three-year term (see page 847 for picture and biography).

Carl F. Clausen, nominee for chairman of the Division, is director of the manufacturing process department, Research & Development Div., of the Portland Cement Assn., with which he has been associated since 1947. A native of Denmark but long a U.S. citizen, he received his education at the Royal Polytechnical Institute of Copenhagen. During World War II and again during the Korean War he represented the cement industry on the War Production Board and the National Production Authority.

Leon Dupuy, designated Secretary-Treasurer, is coordinator of Mineral Resources Studies of River Basins, U.S. Bureau of Mines, Washington, D.C. After graduating from the University of Arizona in 1921, he worked for various mining operations in the Southwest, Mexico, and California until 1941, when he joined the USBM in Tucson, Ariz.

Vice chairmen of the Division are chosen to represent designated areas of the U.S. and Canada. **George F.**

Pettinos, Jr., president of George F. Pettinos Inc., has been named representative of the Northeast area. His first job was with Westinghouse Electric Co. in its research laboratory in Pittsburgh. He joined his present company, of which George F. Pettinos, Sr., was then president, in 1926. **H. E. Uhland**, superintendent of mining and beneficiation for the phosphate operations of International Minerals & Chemical Corp., has been nominated for the Southeast region. The Mid-Continent will be represented by **Frank R. Hunter**, chief geologist, Industrial Minerals Div., International Minerals & Chemical Corp., the position he has held since 1957. **Ralph H. Wilpolt**, nominated to represent the Rocky Mountain area, is manager of the minerals division of The Superior Oil Co. of California, Grand Junction, Colo. The Pacific Southwest representative will be **Fred Lohse**, who operates his own fertilizer business in Reno and does consulting work on industrial minerals projects.

P. E. Oscarson has been named representative for the Pacific Northwest. Since 1945 he has had a private consulting practice as a mining engineer with an office in Spokane. **William T. Bray** of Canadian Refractories Ltd., has been selected to serve as representative of the Canadian area. Mr. Bray has been with Canadian Refractories Ltd. for 22 years, rising from miner to his present position as mine manager.

The following members have been nominated to three-year terms on the Executive Committee: **Robert S. McClellan**, vice president of Gouverneur Talc Co., subsidiary of R. T. Vanderbilt Co. Over 20 years ago he entered the nonmetallic field and has been in charge of several mines for R. T. Vanderbilt Co. **Richard H. Jahns**, recently appointed chairman, Div. of Earth Sciences, The Pennsylvania State University, beginning in September. A graduate of California Institute of Technology, he was a member of its faculty from 1946 until this year. **John S. Holland**, chief geologist, National Lead Co. After graduating from the University of Idaho, Mr. Holland went to work for Consolidated Mining & Smelting Co. at Kimberley, B.C. He joined National Lead in 1948.

Donald R. Irving has been nominated the Division's representative on the SME Transactions Editorial Committee and **Richard H. Jahns** will represent the Division on the SME General Editorial Committee as well as serving on the Executive Committee. Mr. Irving is assistant to the chief, Division of Minerals, U.S. Bureau of Mines.

T. L. Kesler, named Division representative on the SME Nominating Committee has been chief geologist at Foote Mineral Co. since 1953. **Lauren A. Wright**, geologist, California Division of Mines, has been named alternate.



P. E. OSCARSON



R. S. McCLELLAN



R. H. JAHNS



J. S. HOLLAND

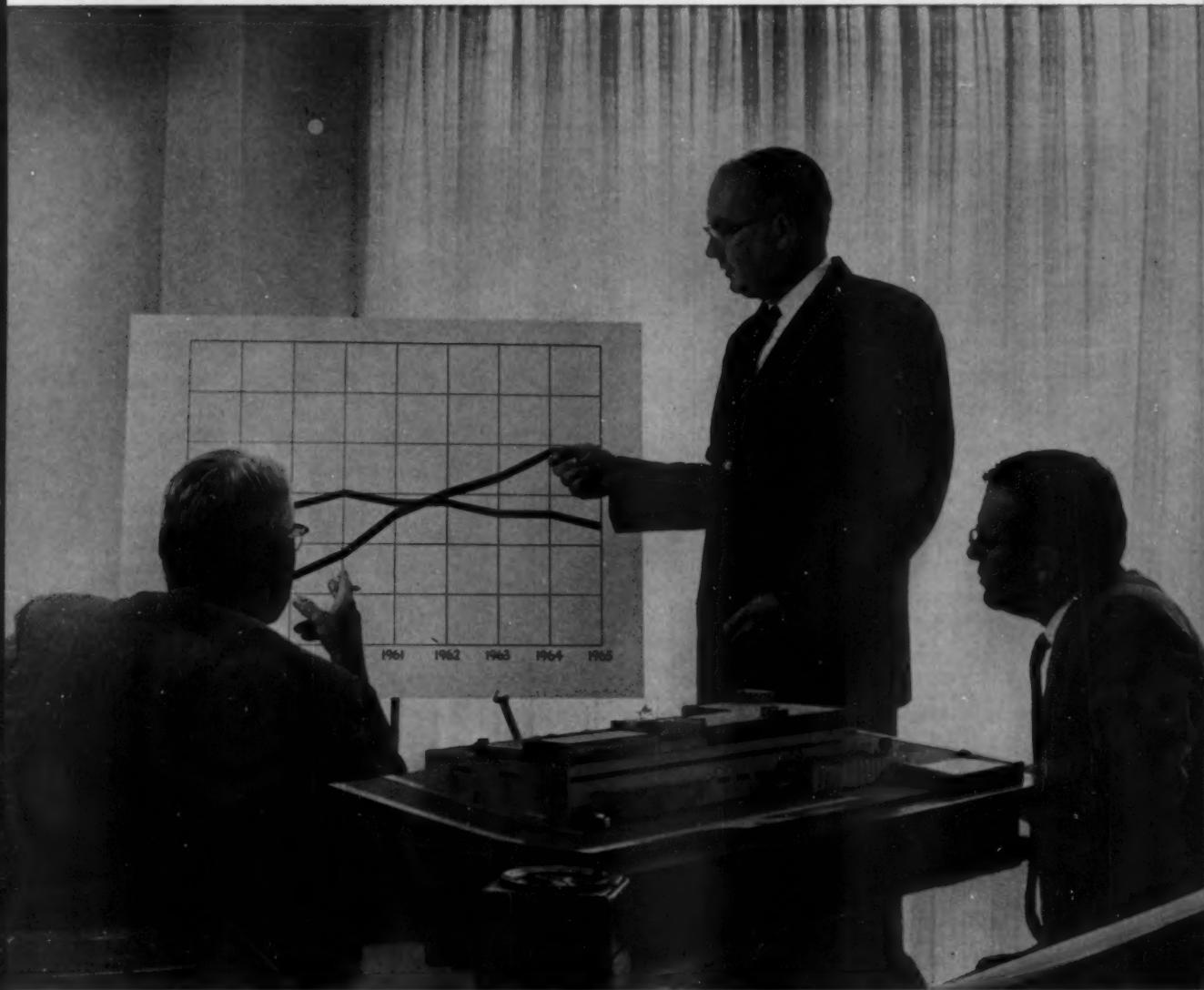


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Around the Sections

• The El Paso Section held a joint meeting with the Kidd Mining Club of Texas Western College on April 21 in the Student Union building. Senior students in mining and metallurgy gave reports on their theses.

The Section's last meeting until fall was its spring dinner dance held May 14 at the Del Norte Hotel.

• The Tucson Subsection of the Arizona Section heard John Harshbarger, professor of geology at the University of Arizona, talk on geological environment and groundwater reserves in Arizona at its May 11 meeting.

• AIME has a new local section, the 92nd. As of April 29, 1960 the Carolinas Section became independent of the Southeast Section and all of its official business on a local level will be carried out autonomously. At present the two Carolinas have two subsections: the Eastern Carolina Subsection includes that area of North Carolina east of Mecklenburg County and the Carolina Subsection includes that portion of North Carolina west of the eastern boundary of Mecklenburg County and all of South Carolina. It is hoped that in time other subsections will become active.

• Members of the San Francisco Section saw a color film entitled *Toquepala Target* at their May 18 meeting in the Engineers' Club. The film, concerning the new, large porphyry copper deposit in southern Peru, was presented by a representative of Utah Construction Co. who also answered questions about the project.

• The Arizona Smelting Division of the Arizona Section met May 7, 1960, in the Veterans of Foreign Wars Hall in Superior, Ariz. The program included the following talks: *Magma's Suspended Arch* by E. J. Caldwell of Magma Copper Co.; *Gaseous Refining of Blister Copper* by L. P. Klein of Phelps Dodge Corp.; and *Reformer Automation in Connection with Gaseous Refining of Blister Copper* by J. H. Davis, also of Phelps Dodge Corp.

• The Southeast Section meeting April 28, 1960, was held in Birmingham. Featured speaker of the evening was Donald G. MacDonald, southern district manager of the E. I. du Pont de Nemours & Co. extension division of the department of public relations. His subject was *From Research to Reality*.



Donald G. Macdonald addresses the Southeast Section at April meeting.

• The Underground Mining Division of the Arizona Section took an underground tour of the Magma Copper Co. east division mine as part of its June 4th meeting. During the afternoon a technical session was held at which papers on Magma's underground operations were presented. The members were guests of Magma Copper for dinner.

• Members of the Adirondack Section toured the Republic Steel Corp. plant at Lyon Mountain, N. Y., on April 30. The tour included the underground and open pit iron mines and crushing, concentrating, and sinter plants. Messrs. Crushberg and Knox discussed the geology and mining methods. Afterwards a dinner was held at the American Legion Home, where Allan Mogensen, the guest speaker, discussed the work simplification program as a means of improving industrial plant efficiency.

• The Chicago Section's annual president's night and dinner dance was held May 7 at the South Shore Country Club. A reception for Joseph L. Gillson and his wife preceded the dinner.

• Members of the Geology Subdivision of the Arizona Section met at the Morenci Branch of Phelps Dodge Corp. May 7. In the morning a technical session was held at which the following topics were presented:



From left to right: G. E. March and E. H. Oshier, both on the faculty of the South Dakota School of Mines, shown with E. O. Kirkendall, AIME secretary, and J. L. Gillson, AIME president, inspecting plans for the new mineral industries building to be completed in 1961 on the campus.

Historical Sketch of the Clifton-Morenci District by William C. Conger; General Geology of the Morenci District by Vance N. Bacon; and Contact Mineralization and Alteration in the Morenci District by Joseph J. Durek. A field trip was held in the afternoon. Phelps Dodge provided a luncheon, a cocktail party, and a banquet for the members.

• The Washington, D. C. Section met on May 3, 1960, at the Broadmoor Hotel to hear Willard Bascom, director of the Mohole Project at the National Academy of Sciences, give an illustrated lecture on this unique project to penetrate the earth's crust. The purpose and planning of this project, as well as the many problems to be overcome in drilling this 31,000-ft hole, almost half through water, were discussed.

• The Black Hills Section held a meeting April 7 at the Moosecamp Lodge in the Black Hills at which Joseph L. Gillson showed colored slides on the pre-Columbian ruins of Mexico. Student associate members enrolled at the South Dakota School of Mines and Technology and their wives were guests of the Section for the occasion. AIME secretary, Ernest Kirkendall, was another guest at the meeting.

• Ronald R. McNaughton, president-elect of AIME, addressed the University of Minnesota student chapter at a meeting April 21 in Minneapolis. His topic was *The Junior Engineer*. Also featured on the program was a discussion of underground mining of taconite by Eugene P. Pfleider and Donald H. Yardley, members of the faculty of the Minnesota School of Mines.



J. L. Gillson inspects a fossil skeleton on display in the paleontology laboratory of the South Dakota School of Mines.

William N. Holzmann has joined the staff at the Carlsbad operation of International Minerals & Chemical Corp. as manager, plant engineering. He comes to International from Escambia Chemical Corp., Pensacola, Fla., where he was service design engineer.

Byron G. Walker who had been an engineering aid with the U.S. Forest Service is presently serving in the U.S. Army as a Second Lieutenant with a topographic battalion surveying and printing maps of Europe.

Augustin L. Queneau metallurgical consultant to a number of metal companies and retired technical assistant to the president of U.S. Steel Corp., has been named the 1960 recipient of the Egleston Medal, Columbia University's highest award for distinguished engineering achievement. The presentation was made at the annual Engineering Dean's Day program April 23 in the Rotunda of Low Memorial Library. The Egleston Medal award was first made in 1939 to honor the memory of Thomas Egleston who founded the first School of Mines in the United States at Columbia in 1864.

George W. Mitchell has retired to Ajijic Jalisco, Mexico. He had been vice president and general manager with Eureka Corp. Ltd. and Rosita Mines Ltd., Nicaragua.

Julio H. Thaler has left Eagle-Picher Co. where he was a mining engineer to take a similar position with Republic Steel Corp. at the Tobin mine.

Charles C. Yeloushan has become assistant mine foreman for Mountaineer Coal Co. He has recently received an M.S. degree in mineral economics from Pennsylvania State University. He had also been working as a mine engineer in training with Rochester & Pittsburgh Coal Co.

Carl S. Weylandt, president and one of the founders of Syntron Co., Homer City, Pa., retired April 30th after more than 40 years service. He will be succeeded by **Byron K. Hartman**. Mr. Weylandt will continue as a member of the board of directors of Syntron, and of the Link-Belt Co., Chicago, of which Syntron is a subsidiary. Mr. Hartman joined the Syntron Co. as executive vice president and general manager in August 1959. Previous to that he had been associated with

the Link-Belt Co. for 21 years.



B. K. HARTMAN



C. S. WEYANDT

J. K. Whatmough formerly a mining engineer with the Ontario Securities Commission, has become general manager for Swanson Construction Co. Ltd. in Winnipeg.

Maurice A. Chaffee has joined The New Jersey Zinc Co. as a geologist in Austinville, Va., following a six-month stint in the U.S. Army Corps of Engineers.

After 16 years as mining geologist with the International Cooperation Administration and predecessor agencies, **Enzo De Chetelat** plans to go into business as a consulting mining geologist in Monsey, N.Y., following his return from abroad where he is doing research work at the Oceanographic Laboratory of the University of Paris. He also plans to attend the International Geological Congress in Copenhagen in August.

Edward P. Kyburz who joined Cerro de Pasco Corp. after receiving his M.S. degree from the University of Arizona in June 1959 has been assigned to the Rio Blanco Project in Chile as a mining engineer.

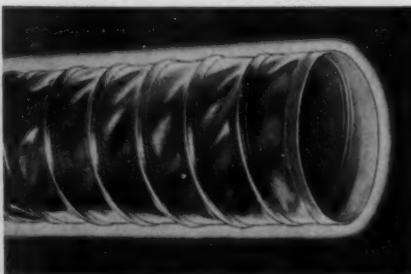
Byron S. Day has become assistant plant superintendent for Electro-Nuclear Metals Inc. He had been with Winnemucca Mining Co. as manager for the last three years.

Upon completion of his graduate studies at the University of California, **William H. Powers** has become a junior technologist at U.S. Steel's Applied Research Laboratory in Pittsburgh.

Paul F. Kerr, Newberry professor of mineralogy at Columbia University, was awarded an honorary D.S. degree by Occidental College, Los Angeles, at its Founders' Day exercises March 24th. The award is in recognition of Dr. Kerr's contribution to the national supply of uranium raw materials during World War II and for his fundamental contributions to the study of clay minerals and studies of the origin and emplacement of mineral deposits.

Personals

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U. S. Steel Corp recently announced the appointment of **J. Robert Ferguson, Jr.**, as assistant vice president-design and construction in the Engineering Dept. Mr. Ferguson's former position was that of assistant vice president-appropriations, a post he held since 1958. He has been with U.S. Steel since 1940.

William J. Leek has been transferred from the Sunflower Ordnance Works, Lawrence, Kan., where he was project engineer to the engineering department of Hercules Powder Co.'s offices in Wilmington, Del.

R. E. Hamilton, formerly mine manager for Bethlehem Copper Corp. in British Columbia has taken a job with Magnet Cove Barium Corp., N.S., as mine superintendent.

Theodore B. Counselman was one of a group of AIME members who met Generalissimo Trujillo during their visit to the Dominican Republic during the post Annual Meeting trip to the Caribbean. The group was received at the National Palace by Trujillo and later were shown the palace.

Don M. Coulter has gone with the Bureau of Indian Affairs in Muskogee, Okla. He had been living in Miami, Okla.

Generoso V. Sancianco has joined the faculty of the Mapua Inst. of Technology in Manila. He had been chief engineer with Pacific Equipment Corp.

J. C. Guyton has recently retired from the Coal & Iron Div. of U.S. Steel Corp. He will continue to reside in Bessemer, Ala.

Bruce M. Lane formerly a metallurgist with Arthur D. Little Inc., Cambridge, Mass., has joined the International Minerals & Chemical Corp. as a mineral development specialist. He is making his home in Evanston, Ill.

Earl L. Rau has become associated with the Colorado School of Mines Research Foundation as a metallurgical engineer. He had formerly been project engineer for Infilco Inc. in Tucson, Ariz.

Link-Belt Co. recently announced the appointment of **Edward L. Mills** as district manager at Huntington, W.Va. to succeed **David W. Stevens** who retired after nearly 48 years of service with the company. **Earl W. Habberstad** succeeds Mr. Mills as district manager at Duluth. Mr. Mills joined Link-Belt at their Chicago plant in 1948. He was appointed district manager at Duluth



E. L. MILLS



D. W. STEVENS



E. W. HABBERSTAD



E. B. GREEF

in 1958. Mr. Habberstad came to Link-Belt as a draftsman in the Minneapolis plant in 1948. He joined the sales department in 1950 and was transferred to Duluth as sales representative in 1951.

Edward B. Greef is the new district manager for the San Francisco office of the Traylor Engineering & Manufacturing Div. of Fuller Co. He will be in charge of sales in California, Nevada, Arizona, and New Mexico. Prior to joining Traylor, Mr. Greef had been a sales representative for Mines Engineering and Equipment Co. in San Francisco.

The American Zinc Inst. recently elected officers and directors at its annual meeting of the Board of Directors. All of its officers were reelected to serve for another year. They are: **R. G. Kenly**, president; **T. A. Campbell**, vice president; **H. D. Carus**, vice president; **E. H. Snyder**,

vice president; **C. H. LeFevre**, treasurer; and **J. L. Kimberley**, vice president and secretary. Directors elected for the term expiring 1963 are: **T. A. Campbell**, **A. C. Eide**, **S. S. Goodwin**, **T. K. Graham**, **H. E. Lee**, **G. W. Potter**, **E. A. Torney**, **H. I. Young**, and **M. M. Zoller**.

Charles B. Lakin has been elected executive vice president and chief executive officer of The Berwind-White Coal Mining Co. and also was elected to the same position in Berwind-White's affiliates, New River and Pocahontas Consolidated Coal Co. and Kentland-Elkhorn Coal Co. Mr. Lakin has been with Berwind-White since 1932 and a vice president since 1956. **Charles E. Dunlap** and **Charles G. Berwind**, president and vice president of the companies, have retired from those positions. Mr. Dunlap will be a chairman of the board and Mr. Berwind will continue as a director.

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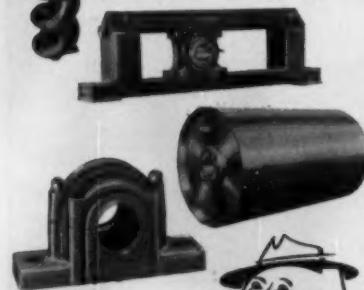
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personals

continued

The board announced that **Edward J. Behn** and **Charles G. Berwind, Jr.**, were elected vice presidents of the three firms. **Zeb H. Herndon** was chosen vice president-lands of New River and Pocahontas Consolidated Coal Co. **Leroy A. French** was made an assistant vice president of Berwind-White, and **Robert H. Seese**, general manager.

Certificates were presented to 21 Colorado School of Mines seniors upon their election to *Who's Who Among Students in American Colleges and Universities*. Three of the recipients were Denver natives: **Andrew J. Dickson**, **Robert B. Hoffman**, and **Carl W. Samuel**. Other Colorado residents included **William N. Houston**, Rye; **Robert F. Jenkins, Jr.**, Julesburg; **George C. Kane**, Salida; **John J. Selters**, Monta Vista; and **John R. Smith**, Stratton. Out-of-state award winners were: **Gerald L. Askevold**, Montana; **A. Lawrence Holmes, Jr.**, New York; **Lennox L. Hagemann**, New York; **S. Bruce Heister**, California; **Robert H. Karlsson**, Arizona; **Kenneth L. Larner**, Florida; **John D. Longnecker**, Pennsylvania; **Ted L. Myers**, New Mexico; **L. Douglas Patton**, Kansas; **Frederick P. Schwarz**, New Jersey; **Kenneth L. Spalding**, California; **Richard E. Van Doren**, North Carolina; and **Glenn A. Walton**, Tennessee.

Harry E. Haynes has been managing the affairs of the company and will continue in an advisory capacity for the new venture. **Dolf W. Fieldman**, who has been with the Carey organization since 1956, will be the geologist in charge of the program.

R. C. Howard-Goldsmit is operating an Ag-pb property he has leased in southern Chile. Prior to this he was office engineer for Wells Overseas Ltd. in Lima, Peru.

Robert M. Jensen, formerly district manager for Allen-Sherman-Hoff Pump Co. at the New York office, has become chief engineer for A-S-H Industries Inc. in Frazer, Pa.

Howard W. Decker has joined Pennsylvania Glass Sand Corp. as project engineer after three and a half years as senior metallurgical assistant for Union Carbide Metals Co.

Rodney K. Pertile has left Jones & Laughlin Steel Corp., where he served as district mining engineer, to take the job of chief mining engineer with Kermac Nuclear Fuels Corp.



P. AMBROSIANI



R. W. FISHER, JR.

Peter Ambrosiani has recently been appointed general manager of sales for Wilcox Manufacturing Co. Prior to this he was manager of western mining territories for the Jeffrey Manufacturing Co. His office will be at the company's factory location in Raleigh, W. Va. The company manufactures continuous mining machines for thin vein coal seams.

R. W. Fisher, Jr., formerly principal engineer with Kaiser Engineers, has been elected a vice president of Kaiser Engineers Overseas Corp. His first assignment will be that of project manager of a 100,000-ton per year portland cement plant being designed and constructed for Mysore Cements Ltd. at Ammasandra, Mysore, India. Mr. Fisher joined the Kaiser organization upon graduation from the University of California in 1941 and has been with them ever since except for a period in the army during World War II.

John W. Svanholm has been appointed advisor to the government of Thailand, where he will plan and direct nuclear raw materials exploration and instruct Thai geologists in geophysical-geological methods. He is attached to the International Atomic Energy Agency, a UN related organization. Prior to his appointment, Mr. Svanholm was consultant with the Mineral Resources Development Corp. to the government of Burma.

Foote Mineral Co. recently announced the appointment of **William M. Raynor** as general sales manager to succeed **Boyd E. Cass**. Mr. Raynor has been with Foote since 1942 and has been director of purchasing since 1956.

Colin C. McAneny has become assistant editor of *Engineering & Mining Journal*. He was previously an engineer trainee with Kennecott Copper Corp.

L. L. McMurray, vice president and engineer with The Feldspar Corp., has moved from their Spruce Pine, N. C. operation to Connecticut to supervise the construction of a new feldspar plant in Middleton with a capacity of 600 tpd (feed) producing both glass and pottery grades. It is expected to go into operation in September 1960.

B. E. Ashton has taken a position as field engineer with Cyanamid Australia Pty. Ltd., after eight years as senior metallurgist with Australian Mineral Development Laboratories.



T. E. CONGDON



W. J. CAREY

A joint mining, exploration, and investment program has been established by **Thomas E. Congdon** of Denver and **William J. Carey** of Dallas, with offices in Denver. Mr. Congdon will direct the program in the Rocky Mountain states. He had been financial manager of western operations for Climax Molybdenum Co. working with the company's exploration department guiding investments in new mining ventures.

Mr. Carey is an independent oil producer who has been active in the mining business since 1954, operating as **William J. Carey Mining Co.**

Glen Sarff, who served as general plant foreman of the tailing reduction plant at the Hill Annex iron ore mine for the Minnesota Ore Div., Jones & Laughlin Steel Corp., has been transferred to the division's new Lind-Greenway ore plant as general plant foreman.

The Aluminum Co. of America recently announced the appointment of **Roy F. Miller** as general manager of the raw material division.

Philip A. Ray, manager of the Denver office of Hercules Powder Co.'s naval stores department, retired May 1. He joined Hercules in 1928 as a metallurgist in the Colorado School of Mines laboratory. When the company's naval stores department opened a district office in Denver in 1944, Mr. Ray was sent there as district manager, after working 16 years in the home office in Wilmington, Del.

Walter Hochschild was elected chairman and chief executive officer of American Metal Climax Inc. at a recent meeting of the board of directors. **Frank Coolbaugh**, formerly head of the Climax division, was named president, succeeding Mr. Hochschild. The new chairman takes over from **Arthur H. Bunker**, who will retire this summer. Mr. Bunker was elected honorary chairman and head of the executive committee. **Weston G. Thomas** resigned as executive vice-president.

Edwin B. Douglas, formerly manager for Calera Mining Co. in Cobalt, Idaho, has taken a position with Managanese Inc. at Henderson, Nev., as general manager.

Promotion of **Martin James**, **Donald J. Goodwin**, and **Michael W. Bremner** to new executives posts was recently announced by the Atlas Copco organization. James, former



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CHANGING YOUR ADDRESS? Don't forget to notify us six (6) weeks before you move, if possible, to insure uninterrupted receipt of your publications and correspondence. Please fill in the form below and send it to: J. F. Lynch, Asst. Treasurer AIME, 29 West 39th Street, New York 18, N. Y.

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PERSONALS: Please list below your former company and title and your new title and company (or new work) for use in MINING ENGINEERING. (Copy deadline for personals items is six weeks before date of issue.)

Name _____

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Former Title _____ Length of Time There _____

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New Title _____ Date of Change _____

Any recent activity that would be of interest to members:

personals

continued

rock drill sales manager for Atlas Copco Eastern, was appointed sales manager of Atlas Copco Pacific's mining and construction divisions with headquarters in San Carlos, Calif. Goodwin, formerly northeast district manager for Atlas Copco

Eastern, was named to replace James at Paramus, and Bremner, formerly sales representative in the Niagara Falls region, was appointed northeast district manager.

John A. Patterson, chief of the Ore Reserves Section at the Grand Junction Operations Office of the Atomic Energy Commission, was awarded a citation and check for \$300 in recognition of the outstanding manner in which he has performed his duties during the past three years.

Wilbur F. Criswell has become mining engineer for Union Carbide Nuclear Co. Prior to this he was em-

ployed as mining engineer with Ray-O-Vac and had spent November through February examining mineral deposits in Mexico, Brazil, and Peru.



R. J. LINNEY



A. A. WALLACH

Reserve Mining Co. recently announced the election of **Robert J. Linney** as president and a director of the company. He will also serve as a member of the executive committee of Reserve Mining. He became manager of operations for Reserve in 1950 and in 1956 was named vice president in charge of operations. Two years later he was elected executive vice president.

A. A. Wallach, mineral industries development engineer, Kaiser Engineers, has been reassigned to the headquarter's office in Oakland, Calif. He will be working as development engineer throughout the U. S. and Canada for engineering and construction services provided by the company in connection with mining and quarrying, rock products, ore processing, and nonferrous metals production. Prior to this new assignment, Mr. Wallach was project manager responsible for the design and construction of an iron ore concentration pilot plant for the Wabush Iron Co., Labrador.

J. M. Van de Plasse has left United Development Corp. Pty. Ltd., where he was chief engineer, to become a sales engineer for Allis-Chalmers Australia Pty. Ltd.

Robert Henderson, general manager for Climax Western Operations, was elected president of the Colorado Mining Association. **J. Paul Harrison**, American Smelting and Refining Co., was elected as one of the vice presidents.

Gil A. Rennhack has joined Atlas Powder Co. as a sales engineer. He previously worked for Sun Electric Corp. as an assembler.

The National Coal Association recently announced some new appointments. **G. Don Sullivan** was named a special assistant to the Association's president, Stephen F. Dunn. Mr. Sullivan has served on the administrative staff for the past eight years. In addition to coordinating the Association's special attention to major industry problems, he will act as liaison between the Association and other organizations representing coal and allied industries.

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Obituaries

Homer A. Mann

An Appreciation By
Weston Bourret

The many friends of Homer Mann (Member 1935) throughout the mining world will be saddened to learn of his tragic death in a plane crash near Minersville, Utah, on Jan. 13, 1960. His kindness, directness, unfailing courtesy, and patience, as well as outstanding capabilities, won him recognition among all who knew him.

Born in Mexico of American parents, Homer returned to the United States as a young child and was educated in Texas and California. After graduation with a B.S. degree in mining from the University of California in 1935, he started his career with the Masbate Consolidated Mining Co., a large gold operation on Masbate Island in the Philippines and held the position of chief engineer and assistant manager at the time of the Japanese attack on Pearl Harbor. He succeeded in getting to Cebu and joined the guerrilla forces under Colonel Peralta in January of 1943. As a guerrilla fighter and officer, Homer served on the Island of Panay and participated in the operation of concealed radio stations so essential to intelligence on enemy movements in the Panay Strait. In March 1944, together with several other Americans on Panay, he was evacuated by the USS Angler and ordered to Australia for intelligence work related to the forthcoming invasion. Following a brief period in the United States and reunion with his family, Homer returned to the Philippines in 1947 with his former employer, Colonel Andres Sariano; there he continued his mining career and was appointed consulting engineer in the Manila office of International Engineering Corp. and its affiliated companies.

During the Korean conflict Homer returned to the United States, this time permanently, and came to Washington, D.C., where he worked for two years with DMPC as chief of the Rare Metals Branch under Tom Lyon and Howard I. Young. He joined Utah Construction & Mining Co. as an executive in the Exploration Dept. in 1953 and since that time has played a major role in the development of that company's uranium, coal, and iron ore properties. At the time of his death Homer was manager of Mining Services for Utah Construction & Mining Co.

George Cherry Lipsey

An Appreciation By
H. A. Pearse & Vinton H. Clarke

The untimely death of George C. Lipsey (Member 1936) at age 57 in Vancouver, B. C., on Jan. 14, 1960, has saddened a host of friends and associates throughout Canada and the United States, and the mining industry has lost one of its most competent leaders.

George was born in Ottawa, of Irish parentage. He received his early education there, then later moved to Vancouver where he attended the University of British Columbia, from which he was granted the degree of B.A.Sc. in mining engineering in 1924. His further education in his chosen profession was according to the classical tradition—starting as a mucker with Britannia Mining & Smelting Co., and working up the line as shift boss, surveyor, foreman, and assistant mine superintendent successively. Then with the opening of the Chelan Div. of the Howe Sound Co. at Holden, Wash., in 1937 he was transferred there as manager. About a year later he returned to Britannia to help cope with certain serious underground problems which had arisen in the meantime.

When development and construction on the Snow Lake, Manitoba, gold project began in 1946, George assumed charge as manager, which post he occupied until in 1956 he returned once again to Britannia as vice president in charge of Canadian operations and exploration activities of the Howe Sound Co. When the slide in base metal prices forced a shutdown of Britannia operations late in 1957, he resigned to accept shortly thereafter the position of general manager of the iron mine operations of The Empire Development Co., Vancouver, which he occupied until his death.

In 1958 he was elected president of the Professional Engineers of British Columbia, which recognition by his fellow engineers must have been a great satisfaction to him, as it certainly was to all of us who so highly respected his ability and integrity.

Necrology

Date Elected	Name	Date of Death
1931	Jos. G. Calverley	Nov. 28, 1959
1917	W. Lorraine Cook	Mar. 30, 1960
1956	Walter K. Farst	Unknown
1956	Otto Hehlert	June 1959
1927	Harry Hey	Apr. 11, 1960
1950	Fred K. Houston	Apr. 13, 1960
1911	R. M. Macauley	Apr. 7, 1960
1935	A. A. McKinney	July 1959
1944	Burton M. Reynolds	Feb. 8, 1960
1950	Louis M. Wulford	Jan. 6, 1960
1954	Virgil W. Whitmer	November 1959

Membership

Proposed for Membership Society of Mining Engineers of AIME

Total AIME membership on May 31, 1960, was 33,606; in addition 2,449 Student Members were enrolled.

ADMISSIONS COMMITTEE

S. S. Cole, Chairman; F. A. Ayer, Vice Chairman; F. Wm. Blocher, Jr.; Jack B. Graham; C. H. Lambur; Pauline Moyd; R. H. Ramsey; A. D. Rood; W. J. Rude.

The Institute desires to extend its privileges to every person to whom it can be of service, but does not desire as members persons who are unqualified. Institute members are urged to review this list as soon as possible and immediately to inform the Secretary's office if names of people are found who are known to be unqualified for AIME membership.

Members

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Richard O. Marsten, Casper, Wyo.

REINSTATEMENT—CHANGE OF STATUS

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Donald L. Everhart, Skokie, Ill.
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Albert J. Turk, Inspiration, Ariz.

Junior to Associate

Frank B. Harris, Englewood, Colo.

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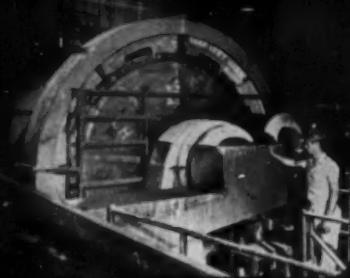


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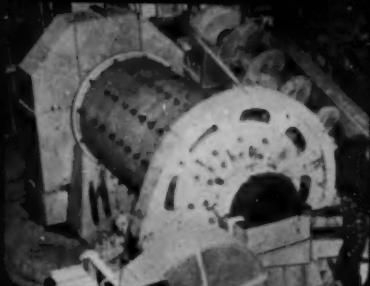
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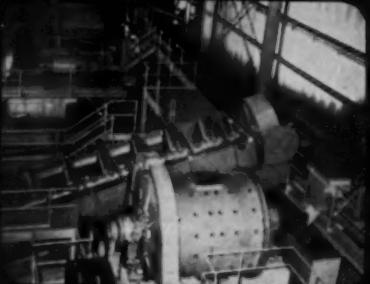
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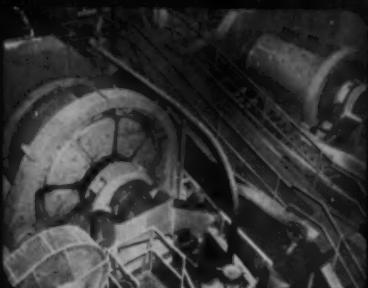
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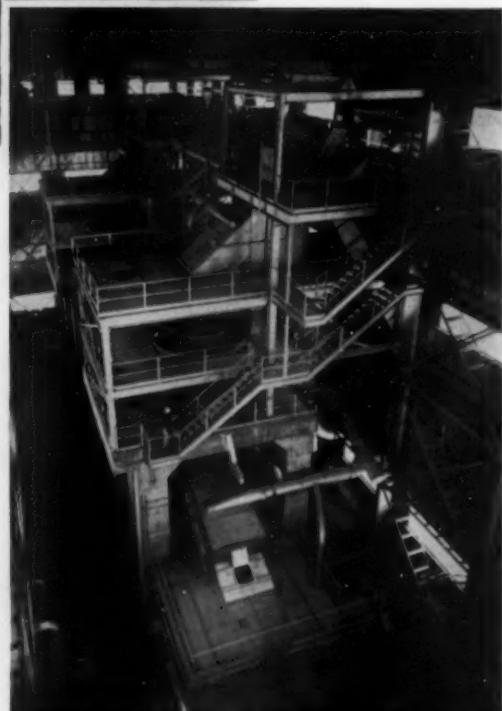
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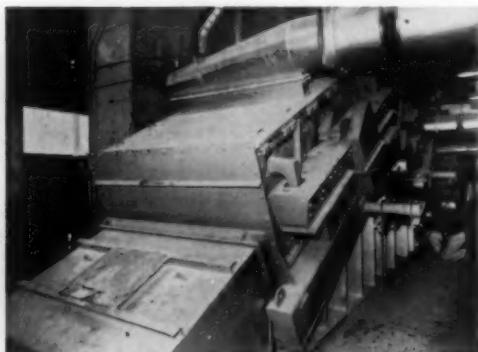
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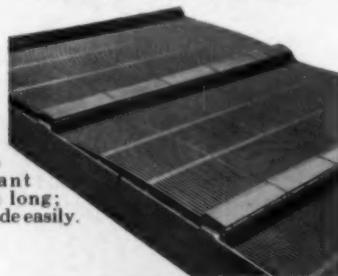
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